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ABSTRACT

This report examines the high school preparation and postsecondary persistence of first-generation students, those whose parents had no education beyond high school, and compares them with students whose parents went to college. The purpose of the study was to examine whether first-generation students who were otherwise equally prepared academically were comparable to students whose parents went to college in terms of their grade point averages (GPAs), number of remedial courses in postsecondary education, and rates of academic persistence. The analysis focuses on a subset of 1995-1996 beginning students who started their postsecondary education at four-year institutions. Data are from the First Followup of the Beginning Postsecondary Students Longitudinal Study for 1995-1996. Findings from the analysis indicate that students who were well prepared for postsecondary education were likely to persist in four-year institutions. Students who took rigorous coursework in high school accounted for more than 80% of those students who stayed on the persistence track to a bachelor's degree or were retained at their initial institution. Parents' levels of education were found to be associated with rates of students' retention and persistence in college, even when controlling for measures of academic preparedness such as rigor of secondary curriculum and college entrance examination scores. These findings hold true even when other related variables are held constant. Two appendixes contain a glossary and technical notes. (Contains 21 tables, 7 figures, and 13 references.) (SLD)

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Statistical Analysis Report May 2001

Postsecondary Education Descriptive Analysis Reports

Bridging the Gap: Academic Preparation and Postsecondary Success of First-Generation Students

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Executive Summary

This report examines the high school preparation and postsecondary persistence of first-generation students—those students whose parents had no education beyond high school—and compares them with students whose parents went to college. Previous research has demonstrated that first-generation students exhibit different college enrollment and persistence behaviors than their counterparts whose parents have more education. Such studies found that first-generation students were less likely than their peers to complete advanced mathematics classes in high school. Even among those qualified for college, first-generation students were less likely to enroll in 4-year institutions (Horn and Nuñez 2000). Independent of other relevant demographic, enrollment, and college involvement factors, first-generation status was also found to be negatively associated with students' persistence and attainment (Nuñez and Cuccaro-Alamin 1998).

What has not been well understood, however, is the extent to which the academic preparation of first-generation students in high school affects their persistence and attainment in postsecondary education. The purpose of this report is to examine whether first-generation students who were otherwise equally prepared academically were comparable to students whose parents went to college in terms of their grade-point averages (GPAs), number of remedial courses in postsecondary education, and rates of persistence (that is, whether they were retained at their first institution, had stayed on a persistence track toward the bachelor's degree,[1] or had attained a degree). This analysis focuses on a subset of 1995–96 beginning postsecondary students who started their postsecondary education in 4-year institutions.

High School Coursetaking

The academic rigor of students' high school curriculum[2] was strongly associated with their postsecondary GPA, the amount of remedial coursework they took, and with their rates of persistence and attainment. As overall high school academic rigor increased, so did students' GPA. Students who did not exceed the requirements of the core New Basics curriculum had a lower GPA than did those who exceeded them (2.5 points versus 3.1 points). The rigor of students' high school curriculum was also related to the number of remedial courses they took during their first year of postsecondary education. As the rigor of the secondary curriculum increased, the proportion of students who took one or more remedial courses decreased from 21 percent to 3 percent.

---

[1]Students' status with respect to the "persistence track to a bachelor's degree" is defined by three values: stayed on the persistence track (i.e., stayed in the same 4-year institution or made a lateral transfer to a different 4-year institution), left the persistence track ("stopped out" for more than 4 months or made an immediate or delayed downward transfer), or left postsecondary education (was neither still enrolled at the initial institution nor had transferred to another postsecondary institution).

[2]"Academic rigor" is defined by four variables that describe the overall difficulty of students' high school coursework: core New Basics or below, beyond New Basics I (somewhat exceeded core New Basics), beyond New Basics II (substantially exceeded core New Basics), and rigorous (maximally exceeded core New Basics).

High school academic preparation was also related to students' likelihood of remaining enrolled in postsecondary education. In general, the more rigorous their high school curriculum, the more likely students were to persist (or to attain a degree) at the initial postsecondary institution in which they enrolled. While 62 percent of students who did not exceed the core New Basics requirements were still enrolled or had attained a degree in spring 1998, 84 percent of students who exceeded the requirements did so. Likewise, the more rigorous the students' high school curriculum, the higher their likelihood of staying on the persistence track to a bachelor's degree: 87 percent of students who took rigorous academic coursework in high school stayed on the persistence track, compared with 62 percent of students who did not take such coursework. Finally, students whose curriculum was rigorous were more likely to still be enrolled and working for a degree than students who did not exceed the core New Basics requirements (93 percent versus 75 percent).

Effect of First-Generation Status

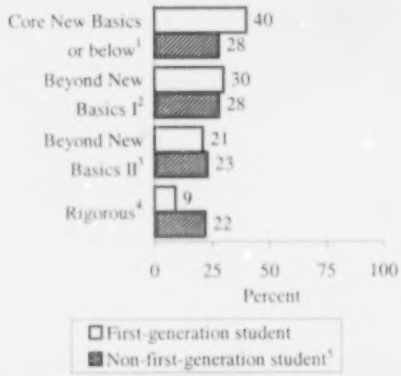
This study found a relationship between parents' education level and the likelihood that students would undertake a more rigorous high school curriculum and, consequently, enroll, perform well, and persist in 4-year postsecondary institutions. Overall, first-generation status was shown to have a negative association with students' academic preparation and persistence.

Preparation for Postsecondary Education

Compared with students whose parents were college graduates,[3] first-generation students were less likely to have taken calculus in high school (20 percent versus 34 percent). A full 40 percent of first-generation students did not exceed the core New Basics curriculum (figure A). Furthermore, while about one-fifth of students whose parents had a bachelor's degree took rigorous courses in high school, just 9 percent of first-generation students did so.

First-generation students were also less likely to take college entrance examinations, and when they did, they were more likely than their peers to

Figure A—Percentage distribution of 1995–96 beginning postsecondary students according to academic rigor of secondary school curriculum, by first-generation status



[1]Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies.

[2]Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language.

[3]Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language.

[4]Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

[5]Non-first-generation students are those whose parents had any college experience.

NOTE: Details may not sum to 100 due to rounding. Includes public and private, not-for-profit 4-year institutions. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

[3]Whenever the term "college graduates" is used, it means that at least one parent had attained a bachelor's degree.

have lower scores. Whereas 15 percent of students whose parents were college graduates scored 790 points or lower on the SAT or ACT (i.e., the lowest quartile), almost 40 percent of first-generation students scored in this quartile. On the SAT II, first-generation students were more likely than their counterparts whose parents were college graduates to score below 550 points and less likely to score 650 points or more. Finally, a lower proportion of first-generation students reported taking any Advanced Placement (AP) tests than did both students whose parents had attended college and those whose parents had graduated (8 percent versus 14 percent and 22 percent, respectively).

Postsecondary Enrollment and Performance

In this study, students' patterns of postsecondary enrollment and academic performance confirmed previous research showing differential behaviors between first-generation students and their peers whose parents were college educated. Of the students who attended 4-year institutions, first-generation students were much more likely to attend public comprehensive institutions instead of research universities than those with at least one parent who had a bachelor's degree (41 percent versus 26 percent). More than one-quarter (27 percent) of first-generation students attended part time, and these students were much more likely to work full time compared to students whose parents had a college degree. By the end of the 1997–98 academic year, a larger proportion of first-generation students (25 percent) had chosen business/management as their major field of study, compared with their non-first-generation counterparts (17 percent).

In general, first-generation students had lower first-year GPAs than students whose parents had a college degree (2.6 versus 2.8), and were more likely to have taken at least one remedial course during their first year of postsecondary education (21 percent versus 10 percent). This difference persisted even after controlling for the rigor of students' high school coursework and college entrance examination scores. Among students who substantially exceeded the core New Basics in high school, first-generation students were more likely to have taken at least one remedial course during their first year of postsecondary education than students whose parents had a college degree (15 percent versus 6 percent). Moreover, among students whose college entrance examination scores were in the lowest quartile, 38 percent of first-generation students had taken at least one remedial course during their first year, compared with 29 percent of students whose parents had a college degree.

However, among students who took rigorous high school courses or scored in the top quartile on their college entrance examinations, first-generation students had first-year college GPAs and remedial coursetaking patterns that were not significantly different from their non-first-generation peers. For example, among students who took rigorous coursework in high school, 95 percent of first-generation students reported taking no remedial courses during their first year, compared to 96 percent of students whose parents completed some college and 97 percent of students whose parents had earned a bachelor's degree. In addition, first-generation students' average first-year GPA was 3.0, which was no different from the average GPA (3.1) of their non-first-generation counterparts with similar academic preparation.

Postsecondary Persistence and Attainment

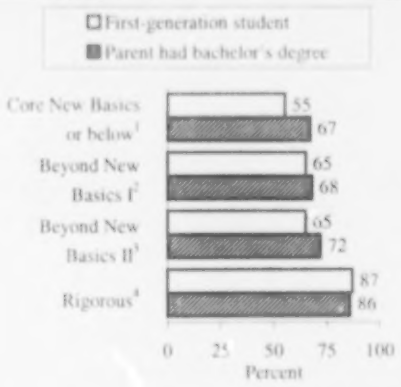
With respect to postsecondary persistence and attainment, four outcomes were examined: the

number of enrollment spells,[4] retention at the initial 4-year institution, persistence track to a bachelor's degree, and attainment or last academic year of enrollment through 1998.

First-generation students were less likely to be enrolled continuously or to attain a degree at their initial postsecondary institution than students whose parents had completed college (60 percent versus 73 percent). They were also more likely to have stopped out[5] or left their first institution of enrollment than their peers whose parents had a college degree (19 percent versus 8 percent). These differences disappeared, however, among students who took rigorous high school courses. In this case, first-generation students were as likely as students whose parents had a college degree to be continuously enrolled or to have attained a degree in June 1998 (87 percent versus 86 percent) (figure B).

The study results also show that students who remained at the initial 4-year institution or made a lateral transfer to a new 4-year institution were considered to have stayed on the persistence track to a bachelor's degree. Overall, first-generation students were less likely than students whose parents had completed a 4-year degree to stay on the persistence track (58 percent versus 77 percent). Not only were first-generation students more likely than their peers whose parents finished college to leave the persistence track through a stopout or downward transfer (22 percent versus 14 percent), they also were more than twice as likely to leave their first institution without returning (21 percent versus 9 percent). Moreover, even among students who took rigorous coursework in high school, first-generation students were almost twice as likely as students whose parents had completed college to leave the persistence track through a stopout or downward transfer (14 percent versus 8 percent).

Figure B—Percentage of 1995–96 beginning postsecondary students who were still enrolled (or had attained bachelor's degree) at initial institution according to academic rigor of secondary school curriculum, by first-generation status: June 1998



[1]Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies.

[2]Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language.

[3]Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language.

[4]Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, pre-calculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

NOTE: Includes public and private, not-for-profit 4-year institutions. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

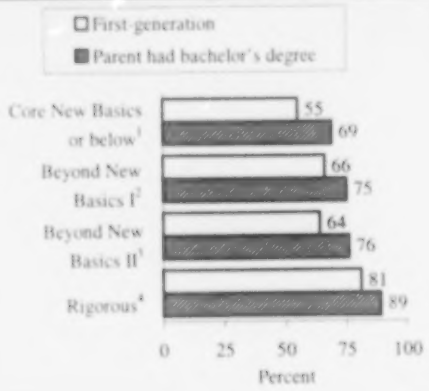
[4]An "enrollment spell" is defined as a period of enrollment without a break of more than 4 months. The number of enrollment spells counts the periods of continuous enrollment (at any institution), each separated by more than 4 months of nonenrollment, through June 1998.

[5]An enrollment spell may end either with a stopout or leaving without return. A "stopout" is defined as a break in enrollment of more than 4 months and a return to postsecondary education. Leaving without return is no enrollment for a period of more than 4 months and no return to postsecondary education as of spring 1998.

Though the negative relationship between first-generation status and persistence was strong and consistent, the picture was more positive when looking at those who left postsecondary education without returning, while controlling for the rigor of students' secondary school curriculum and their scores on college entrance examinations. Among those students who took a rigorous high school curriculum, first-generation students and students whose parents completed college had similar rates of postsecondary departure without return (5 percent and 3 percent). And though first-generation students who did not exceed the core New Basics in high school were less likely to stay on the persistence track to a bachelor's degree compared to their counterparts (55 percent versus 69 percent), the likelihood of staying on the persistence track for students who took rigorous coursework did not differ meaningfully for first-generation students and students whose parents had a bachelor's degree (81 and 89 percent, respectively) (figure C).

Finally, this study examined overall rates of persistence and attainment in spring 1998, 3 years after initial enrollment. Students whose parents had a bachelor's degree were more likely than their first-generation peers to have attained a degree or to still be enrolled 3 years after entering a 4-year institution (88 percent versus 73 percent). This difference was particularly evident for first-generation students who did not take a rigorous curriculum in high school: they were much less likely than students whose parents completed college to be enrolled 3 years after entering a 4-year institution (65 percent versus 85 percent).

Figure C—Percentage of 1995–96 beginning postsecondary students who stayed on persistence track to bachelor's degree according to academic rigor of secondary school curriculum, by first-generation status: June 1998



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NOTE: A student who stays on the persistence track either remains at the initial 4-year institution in which they enrolled or makes a lateral transfer to a new 4-year institution with no break in enrollment. Includes public and private, not-for-profit 4-year institutions. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Conclusion

The findings from this analysis indicate that students who were well prepared for postsecondary education were very likely to persist in 4-year institutions. Students who took rigorous coursework in high school accounted for more than 80 percent of those students who either stayed on the persistence track to a bachelor's degree or were retained at their initial institution. At the same time, parents' levels of education were found to be associated with rates of students' retention and persistence in college, even when controlling for measures of academic preparedness (such as rigor

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of secondary curriculum and college entrance examination scores).

These findings hold true even when other related variables are held constant. That is, even after controlling for variables such as academic preparation and postsecondary achievement, parents' education continued to be a significant factor in determining whether students persisted, were enrolled at their initial institution 3 years after entering, or stayed on the persistence track. Students whose parents attained a bachelor's degree were more likely than first-generation students to remain enrolled at their initial 4-year institution. Likewise, after controlling for related variables, students whose parents attained a bachelor's degree or higher were more likely to stay on the persistence track to a bachelor's degree than first-generation students.

At the same time, after holding all other variables constant, students who took rigorous coursework in high school significantly increased their chances of staying on the persistence track to a bachelor's degree. Taken together, these results suggest that, while first-generation status is an important predictor of success in postsecondary education, rigorous preparation in high school substantially narrows the gap in postsecondary outcomes between first-generation students and their peers whose parents graduated from college.

Foreword

This report describes the experiences of a subset of 1995–96 beginning postsecondary students. It examines the high school preparation and postsecondary education persistence of first-generation students—that is, students whose parents never enrolled in college—and compares them with students whose parents attended or graduated from college.

This report uses data from the 1995–96 Beginning Postsecondary Students Longitudinal Study (BPS:96/98), First Follow-up, which tracks the experiences of a cohort of students who began postsecondary education in 1995–96. The First Follow-up was conducted in spring 1998, about 3 years after this cohort of students first enrolled. Unlike the original BPS study, which was administered in 1989–90 and provided little information on students' high school academic preparation, the BPS:96/98 First Follow-up includes data on courses completed in high school, as reported by students on SAT or ACT test questionnaires and student achievement test scores.

The estimates presented in the report (mostly percentages) were produced using the NCES Data Analysis System (DAS), a microcomputer application that allows users to specify and generate tables, for the BPS:96/98 study. The DAS produces the design-adjusted standard errors necessary for testing the statistical significance of differences in the estimates. For more information on the DAS, readers should consult appendix B of this report.

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Introduction

For a majority of high school graduates, the next step in their social, intellectual, and economic development is postsecondary education. Between 1972 and 1998, the percentage of 16- to 24-year-old high school graduates immediately entering college increased from 49 to 66 percent (U.S. Department of Education 2000). For some high school students, especially those whose parents have less education, the transition to college requires more consideration, because it offers both opportunity and risk. Among these students are those who are the first members of their immediate families to enroll in postsecondary education, often referred to as "first-generation students."

First-generation students exhibit different college enrollment behaviors than their counterparts whose parents have more education (Levine and Nidiffer 1996; Nuñez and Cuccaro-Alamin 1998; Terenzini et al. 1996). A recent analysis of data from the Third Follow-up of the National Education Longitudinal Study of 1988 (NELS:88/94) supports this finding. Among students who were highly proficient in mathematics in 8th grade (as measured by a NELS proficiency test), first-generation students were less likely than their peers whose parents held college degrees to have completed advanced mathematics classes in high school; similarly, among those who were qualified for college, first-generation students were less likely than non-first-generation students to enroll in 4-year institutions (Horn and Nuñez 2000). These differences persisted even when controlling for demographic characteristics, academic preparation, and college planning activities.

First-generation status is also negatively associated with persistence and attainment in postsecondary education. Persistence of beginning postsecondary students is affected by a variety of factors, including income, race/ethnicity, delayed entry, and financial aid. While financial aid in the form of grants appears to lower the probability of low-income and minority students' dropping out of college (U.S. General Accounting Office 1994, 1995), among undergraduates who began their postsecondary education in 1995–96, low-income students were less likely than their non-low-income counterparts to have attained or be enrolled 3 years later, even after controlling for student background and loan assistance (Choy 2000). In addition to financial aid, parents' education level has been shown to be an important factor in postsecondary persistence. First-generation students who entered college in 1989–90 were less likely than other students to be still enrolled or to have completed their education 5 years later (Nuñez and Cuccaro-Alamin 1998).

Although first-generation students appear less likely than non-first-generation students to complete a degree, recent research suggests that a college degree is key in helping first-generation students improve their economic status. The 1993 Baccalaureate and Beyond Study (B&B:93/94) data showed that, among first-generation students who completed a 4-year degree, those in the labor market 1 year after completing their degrees had similar occupations and salaries to their non-first-generation peers (Nuñez and Cuccaro-Alamin 1998).

The purpose of this study is to build on this earlier work by examining whether first-generation students who were otherwise equally prepared academically—as demonstrated by their coursetaking in high school and college entrance examination scores—persist in college at a rate similar to that of students whose parents went to college. Though Nuñez and Cuccaro-Alamin (1998) found that first-generation students were less likely than their counterparts to persist in college, they were not able to control for key indicators, such as academic preparation in secondary education. Consequently, it was not possible to determine whether differences in persistence were a function of students' academic preparation for postsecondary work. Using newly available data, this study adds to this research by investigating how first-generation and non-first-generation students differ in their academic preparation for college. By controlling for academic preparation when examining rates of persistence and attainment in postsecondary education, this report provides a better understanding of the unique circumstances of first-generation students and the conditions that promote educational success.

Report Organization

This report examines the academic preparation and postsecondary persistence of 1995–96 beginning postsecondary students, comparing first-generation students with those whose parents either have some college education or attained a bachelor's degree. The report begins with a brief description of the background characteristics of first-generation students. The analysis then examines the postsecondary education outcomes of students who enrolled in a 4-year college or university while controlling for academic preparation and first-generation status. Finally, to measure the independent effects of first-generation status and high school academic preparation on persistence and attainment, multivariate analyses were conducted to control for related variables.

It is important to note that, because most of the between-group variation pertained to first-generation students and those students who had at least one parent who had a bachelor's degree,

most of findings reported here are between these two groups.[1] Significant differences between either of these groups and those students whose parents had some college are noted in the text.

The report addresses the following questions:

Preparation for Postsecondary Education

- How does the rigor of students' academic coursework in high school vary with first-generation status?
- How do the college entrance examination results of first-generation and non-first-generation students differ?

Postsecondary Enrollment Behavior, Academic Performance, and Persistence and Attainment

After controlling for academic preparation in high school,

- How do postsecondary enrollment behaviors—e.g., type of institution, enrollment and employment status (full-time versus part-time), and major field of study—vary between first-generation and non-first-generation students?
- Does remedial coursetaking vary between first-generation and non-first-generation students?
- Does the postsecondary academic achievement (measured by first-year grades) of first-generation and non-first-generation students differ?
- How likely were students to persist 3 years after first entering postsecondary education, and how do the persistence patterns of first-generation and non-first-generation students differ?

[1]The lack of significant differences between first-generation students and students whose parents had some college education is partly due to the high variability in the some-college group.

Data

This study uses data from the Beginning Postsecondary Students Longitudinal Study (BPS:96/98), which tracks the experiences of a cohort of students who began postsecondary education in 1995–96. The First Follow-up survey took place in spring 1998, about 3 years after the beginning postsecondary students initially enrolled. To determine first-generation status, the survey obtained information about the highest education level completed by either parent, primarily from telephone interviews of students. This variable reflects editing of parental education levels when occupation and education levels were discrepant (Adelman 1999). The study also gathers data on student persistence in public and private, not-for-profit 4-year institutions over the 3 years encompassed by the First Follow-up of the 1995–96 BPS cohort.[2]

Unlike the first BPS study, which began in 1989–90 and provided little information on high school academic preparation, the 1995–96 BPS study includes data on courses completed in high school, as reported by students on SAT or ACT test questionnaires, and achievement test scores.[3] The 1995–96 BPS study also includes data on high school characteristics—data that were obtained from the Common Core of Data (CCD). These additional data allow in-depth examination of students' high school experience and academic preparation for college.

First-Generation Students

A major focus of this report is making comparisons across three levels of parents' highest education.[4] These education levels were aggregated as follows (Horn and Nuñez 2000):

- First-generation—Neither parent had more than a high school education. Thus, the student was a member of the first generation in the immediate family to attend college.

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[2]The sample size of students entering 4-year private, for-profit institutions is too small to be included as a category.

[3]These data (except for AP tests) are available only for students who took the SAT or ACT: 93 percent of students at 4-year institutions (public and private, not-for-profit) and 43 percent of those at public 2-year institutions, representing approximately 6,800 and 500 unweighted cases, respectively. Not only are academic preparation data available only for a minority and small sample of public 2-year institution students, but the analysis of persistence and meaning of transfer during the study period would not be parallel with that for 4-year students, due to certificate and transfer program completions. For this reason, the study is limited to students who began at public and private, not-for-profit 4-year institutions.

[4]Parents' level of education was obtained from parents' reports in the 1995 Base-Year survey.

- Some college—One or both parents had some postsecondary education, but neither had attained a bachelor's degree. This category includes parents who attained no more than vocational certificates and associate's degrees.
- College graduate—One or both parents earned a bachelor's degree or higher.

Preparation for Postsecondary Education

High School Mathematics

The level of mathematics coursetaking in high school is a significant predictor of students' postsecondary enrollment and of attaining a college degree (Adelman 1999; Horn and Nuñez 2000; Riley 1997). This analysis uses a standardized mathematics coursetaking variable that presents the highest level of mathematics coursework completed, as reported by students on the application for the SAT/ACT test.

Academic Rigor of High School Courses

Another indicator of high school academic preparation is the overall difficulty of students' coursework. Using previous research as a guide, the variable "academic rigor" was created (Adelman 1999; Burkam, Lee, and Smerdon 1996). Academic rigor takes into account 1) the number of courses that students completed in academic subjects (mathematics, science, English, social studies, and foreign language); 2) the level of courses students took in mathematics and science; and 3) whether students took any honors or Advanced Placement (AP) courses. In cases in which information on honors/AP coursetaking was missing, this study used AP test-taking as supplementary data. If AP records indicated that students had taken an AP test, it was assumed that they had taken an honors/AP course. For this analysis, coursetaking was aggregated into the following four levels (listed in order from least to most advanced):

- ***Core New Basics[5] and below*** *(did not exceed core New Basics threshold)*—Student completed core New Basics curriculum: 4 years of English and 3 years each of science, mathematics, and social studies;
- ***Beyond New Basics I*** *(somewhat exceeded the core New Basics threshold)*—Student completed core New Basics curriculum that included at least two of the following three science courses—biology, chemistry, or physics—and algebra I and geometry, plus 1 year of foreign language.

[5]The core "New Basics" curriculum was first advocated by the National Commission on Excellence in Education in *A Nation at Risk* (1983). The commission recommended that high school students take a more rigorous sequence of courses.

- ***Beyond New Basics II*** *(substantially exceeded the core New Basics threshold)*—Student completed core New Basics curriculum that included advanced science (biology, chemistry, and physics) and advanced mathematics (algebra I, geometry, and algebra II), plus 2 years of foreign language.
- ***Rigorous*** *(maximally exceeded the core New Basics threshold)*—Student completed core New Basics curriculum that included advanced science (biology, chemistry, and physics), 4 years of mathematics (algebra I, geometry, algebra II, pre-calculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

As indicated above, students were classified as having taken "rigorous" coursework in high school only if they fulfilled all the course requirements for that category. For example, some students may have completed more rigorous coursework than what is listed in the category "beyond New Basics I," but they remained in this category unless they met all the criteria for the next higher category, "beyond New Basics II."

Other Indicators of High School Academic Preparation

The final indicators of high school academic preparation are the students' scores on college entrance examinations. These data include students' SAT I (or equivalent ACT) composite scores and SAT II scores. In addition to supplementing missing data from students' self-reports about honors/AP coursetaking, data concerning students' AP test-taking (that is, whether students took two or more, one, or no AP test) were included in the analysis.

Additionally, newly available CCD data, including the racial/ethnic composition and location of students' high schools, were included in the analysis. Together, the coursetaking, achievement/test-taking, and other variables related to students' high school experiences allow one to examine whether, as previous research has suggested, first-generation students are less academically prepared than others for college-level work. If they are, these data allow one to study how this relative lack of preparation may be related to their postsecondary outcomes.

In addition to the academic preparation and background variables described above, key independent variables include demographic factors such as gender, age, socioeconomic status (SES), and race/ethnicity. First-generation status is the primary independent variable of the analysis.

Postsecondary Enrollment and Performance

Postsecondary enrollment and academic performance are key dependent variables. These variables include the type of 4-year postsecondary institution in which students first enrolled, the

number of remedial courses taken by students in their first year of college, and students' postsecondary grade-point averages (GPAs) during their first year of enrollment.

Persistence and Attainment

In this analysis, persistence was defined as students' status in relation to their enrollment in the initial 4-year institution. Three primary variables were used to examine persistence: 1) retention—that is, whether a student is still enrolled in the same institution 3 years later; 2) persistence track to bachelor's degree—that is, whether a student stays at the initial 4-year institution or makes a lateral transfer to a new 4-year institution; and 3) persistence/attainment in postsecondary education—that is, whether students left without attaining their degree, remained enrolled, or had attained a degree. In addition, this study examined persistence behavior by noting the number of enrollment spells a student took since entering a 4-year institution in 1995–96.

Retention at initial institution is composed of the following three values:

- Student still enrolled in or attained a degree at the initial institution (including students who stopped out and later returned to their initial institution).
- Student transferred to another postsecondary institution (still enrolled, the type of transfer destination reflects the institution to which students transferred)
- Student left postsecondary education (neither still enrolled at the initial institution nor transferred to another postsecondary institution).

Persistence track to bachelor's degree is composed of the following three values:

- Student did not leave persistence track (stayed enrolled in the same institution or made a lateral transfer to a different 4-year institution).
- Student left persistence track (stopout, immediate or delayed transfer from 4-year to less-than-4-year postsecondary institution).
- Student left postsecondary education (neither still enrolled at the initial institution nor transferred to another postsecondary institution).

Persistence and attainment in postsecondary education is composed of the following three values:

- Student left without attaining a bachelor's degree in any of the 3 years following initial enrollment.
- Student remained enrolled in a 4-year postsecondary institution by June 1998.
- Student had attained a bachelor's degree from a 4-year postsecondary institution by June 1998.

Profile of First-Generation Students

Findings from this study support previous research demonstrating that first-generation students have particular demographic characteristics that distinguish them from other students (Horn and Nuñez 2000; Nuñez and Cuccaro-Alamin 1998). In 1995–96, first-generation students represented 31 percent of students who began postsecondary education in 4-year institutions. As shown in table 1, first-generation students tended to be older than non-first-generation students: 7 percent of first-generation students were age 30 or older, compared with 1 percent of non-first-generation students. In addition, first-generation students were more likely than all non-first-generation students to be Hispanic (18 percent versus 7 percent). However, first-generation students were no more likely than students whose parents had some college to be black, non-Hispanic.

The family characteristics of first-generation students also differed from those of their non-first-generation counterparts. In general, first-generation students were more likely than non-first-generation students to speak a language other than English at home (16 percent versus 7 percent). They were also more likely than students whose parents either finished college or had some postsecondary education to come from low-income families (29 percent versus 9 percent and 20 percent, respectively).[6] A larger proportion of first-generation students were married, compared with students whose parents completed college (7 percent versus 1 percent), and first-generation students were more likely than students whose parents had some college education to be foreign born (11 percent versus 6 percent).

High School Location and Type

First-generation students were less likely than students whose parents had 4-year degrees to have attended high schools in mid-sized cities or urban communities (table 2). About one-third of all first-generation students attended a high school in an urban area, whereas more than 40 percent of students whose parents had a college degree did so. Conversely, first-generation students were more likely than those whose parents had a bachelor's degree to have attended a high school located in a small town (15 percent versus 10 percent) or rural area (18 percent versus 10 percent).

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[6]These income quartiles were based on quartiles defined by the National Postsecondary Student Aid Study (NPSAS:96) data. Refer to appendix A for a more detailed description of how the income variable was derived.

Table 1—Percentage distribution of 1995–96 beginning postsecondary students according to selected demographic and academic characteristics, by first-generation status

	First-generation student	Non-first-generation student		
		Total	Parent had some college	Parent had bachelor's or advanced degree
Total	100.0	100.0	100.0	100.0
Age at entrance into postsecondary education				
18 years or younger	71.0	82.8	80.3	83.7
19–24 years	20.2	15.4	16.9	14.9
25–29 years	1.8	1.1	1.5	1.0
30 years or older	7.1	0.7	1.2	0.5
Gender				
Male	44.2	45.5	40.3	47.4
Female	55.8	54.5	59.7	52.7
Race/ethnicity				
Asian/Pacific Islander	5.5	6.0	3.7	6.7
Hispanic	18.1	7.4	11.0	6.1
Black, non-Hispanic	13.5	8.2	12.8	6.7
White, non-Hispanic	61.3	76.1	70.6	78.0
American Indian/Alaskan Native	0.6	0.7	0.4	0.8
Family income[1]				
Low income	28.7	12.0	19.6	9.4
Middle income	67.4	68.3	71.0	67.4
High income	3.9	19.7	9.4	23.3
Marital status				
Not married[2]	92.9	98.1	96.0	98.8
Married	6.5	1.8	3.9	1.0
Separated	0.6	0.2	0.1	0.2
SAT I or equivalent ACT composite score				
Lowest quartile (790 or lower)	39.6	20.3	35.1	15.3
Middle quartile (800–1090)	48.0	51.3	49.7	51.9
Highest quartile (1100 or higher)	12.4	28.4	15.2	32.9
Place of birth				
Born in United States[3]	88.9	92.0	93.9	91.4
Born outside United States[4]	11.1	8.0	6.2	8.6
Language spoken at home				
English	84.1	93.3	93.4	93.3
Other than English	15.9	6.7	6.6	6.7

[1]Low income defined as below 125 percent of the 1994 federal poverty level. Middle income defined as 125 through 634 percent of the 1994 federal poverty level. High income defined as 635 percent of the federal poverty level or more.

[2]Includes the following categories: single, never married; living as married, never married; divorced; widowed; and living as married, previously divorced.

[3]Native-born students are those who are natives of United States.

[4]Foreign-born students include naturalized citizens and permanent residence and nonresident aliens.

NOTE: Column details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Table 2—Percentage distribution of 1995–96 beginning postsecondary students according to location of high school, by first-generation status

	Large city	Mid-sized city	Urban	Large town	Small town	Rural
Total	16.3	17.7	39.1	2.1	11.3	13.5
First-generation status						
First-generation student	17.5	13.7	34.7	1.3	14.9	18.0
Non-first-generation student	15.6	18.8	40.6	2.4	10.6	12.0
Parent had some college	13.9	16.0	37.6	1.9	13.8	16.8
Parent had bachelor's or advanced degree	16.2	19.8	41.6	2.6	9.5	10.4

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). Large city indicates a population of 250,000 people or more. Mid-size city indicates a population of less than 250,000 people but more than 25,000 people. Urban indicates a population on the fringe of a large city. Large town indicates either the population located on the fringe of a mid-size city or the population of a large town greater than 25,000. Small town contains less than 25,000 people in the population.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

First-generation students attended different kinds of high schools as well. Whereas a larger proportion of students whose parents went to college graduated from private high school than did first-generation students (12 and 18 percent versus 8 percent), 92 percent of first-generation students attended public high schools (table 3). Moreover, first-generation students were slightly more likely than non-first-generation students to attend a school where more than three-quarters of the student body was identified as underrepresented minority students (8 percent versus 5 percent).

Table 3—Percentage distribution of 1995–96 beginning postsecondary students according to type of high school and percentage enrollment of underrepresented minority, by first-generation status

		Non-first-generation student		
	First-generation student	Total	Parent had some college	Parent had bachelor's or advanced degree
Total	100.0	100.0	100.0	100.0
Type of high school				
Public	91.8	83.3	87.7	81.8
Private	8.2	16.7	12.3	18.2
Percentage enrollment of underrepresented minority				
0–25 percent	61.9	66.5	61.9	68.6
26–50 percent	19.3	17.7	19.9	16.7
51–75 percent	10.8	11.0	12.8	10.1
76–100 percent	8.0	4.9	5.4	4.7

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). Includes private Catholic, other religious, and nonreligious high schools.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Preparation for Postsecondary Education

The well-documented relationship between taking advanced mathematics courses in high school and attending college is reconfirmed in this study. What is not well understood, however, is how first-generation students' academic preparation in high school affects their postsecondary persistence. Using variables describing the overall difficulty of students' coursework and academic achievement—that is, scores from college entrance examinations (SAT I/ACT, SAT II) and Advanced Placement (AP) examinations—this study investigates whether the academic preparation of first-generation students differs from that of their counterparts whose parents went to college.

Academic Preparation

This study confirmed previous reports that the proportion of first-generation students who took advanced mathematics courses was lower than that of their non-first-generation peers (table 4). Compared with students whose parents had a college degree, first-generation students were more likely to have taken geometry (7 percent versus 4 percent) and algebra II (26 percent versus 17 percent) as their highest high school mathematics course and were less likely to have taken calculus (20 percent versus 34 percent).

Table 4—Percentage distribution of 1995–96 beginning postsecondary students according to highest mathematics course taken in high school, by first-generation status

	Algebra I	Geometry	Algebra II	Trigo-nometry	Pre-calculus	Calculus
Total	1.6	5.0	20.6	19.8	24.9	28.2
First-generation status						
First-generation student	2.9	6.7	25.5	22.0	23.1	19.8
Non-first-generation student	1.3	4.5	18.9	18.3	25.7	31.3
Parent had some college	2.3	6.6	24.0	18.9	24.2	24.0
Parent had bachelor's or advanced degree	1.0	3.7	17.2	18.1	26.2	33.8

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

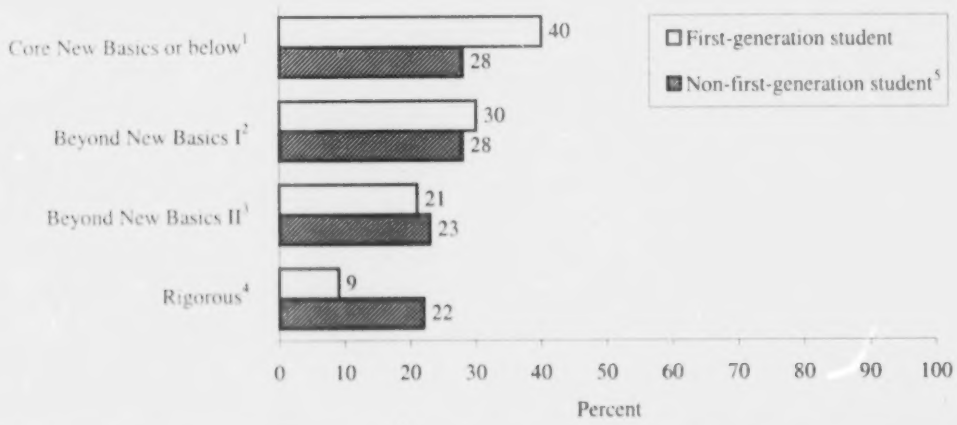
SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

First-generation students also took less rigorous coursework in high school than their peers whose parents went to college (figure 1). Whereas 40 percent of first-generation students completed a nonrigorous high school curriculum, 28 percent of those whose parents went to college did so. Furthermore, although about one-fifth of students whose parents went to college completed a rigorous secondary curriculum, only about one-tenth of first-generation students did so.

Advanced Placement and College Entrance Examinations

To measure high school academic achievement, this study analyzed whether students took college entrance examinations, which tests they took (SAT/ACT, SAT II, AP), and how well they

Figure 1—Percentage distribution of 1995–96 beginning postsecondary students according to academic rigor of secondary school curriculum, by first-generation status



[1]Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies.

[2]Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language.

[3]Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language.

[4]Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

[5]Non-first-generation students are those whose parents had any college experience.

NOTE: Details may not sum to 100 due to rounding. Includes public and private, not-for-profit 4-year institutions. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

scored on these examinations.[7] Overall, first-generation students were less likely to take college entrance examinations, and when they did, they scored lower than their peers who were not first-generation (table 5).

First-generation students were less likely than their non-first-generation counterparts to take a college entrance examination (SAT I or ACT). While 83 percent of first-generation students took a college entrance examination, 93 percent of students whose parents had some college education and 96 percent of students whose parents had a college degree took the SAT I or ACT.

The varying levels of achievement on these tests provide further evidence of how first-generation students' academic achievement differs from that of their counterparts whose parents attended college. First-generation students' average score on the college entrance examination was 858 points, compared with 899 points for students with parents who had some college and

Table 5—Percentage of 1995–96 beginning postsecondary students who took college entrance examinations (SAT/ACT, AP, SAT II), average SAT/ACT and AP scores, and percentage distribution of SAT II scores, by first-generation status

			Non-first-generation student	
	Total	First-generation student	Parent had some college	Parent had bachelor's or advanced degree
SAT/ACT				
Percentage taking SAT/ACT	91	83	93	96
Average SAT/ACT score	948	858	899	1011
Advanced Placement (AP) test				
Percentage taking AP test	16	8	14	22
Average score on AP test	3	3	3	3
SAT II				
Percentage taking SAT II tests	17	8	11	23
Percentage distribution of SAT II scores				
Less than 450	5	15	11	2
451–550	29	43	48	23
551–650	43	35	35	47
651 or more	23	8	6	28

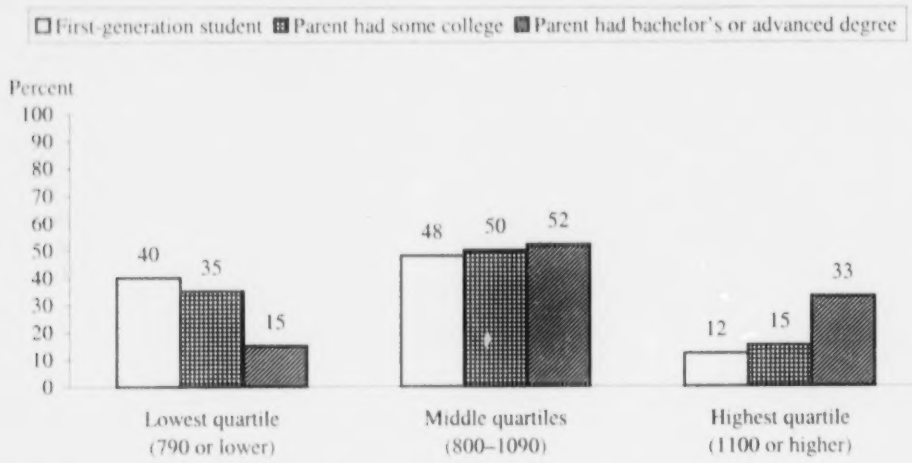
NOTE: Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Testing (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score. The SAT II is composed of subject specific tests.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

[7]The variable SAT/ACT is a composite variable. Refer to appendix A for a detailed description of how it was derived.

1011 points for students whose parents had completed college. Whereas 15 percent of students whose parents had completed a 4-year degree scored in the lowest quartile on the examinations, 40 percent of first-generation students scored in this quartile (figure 2). Conversely, first-generation students were less likely than students whose parents had completed college to score in the highest quartile (12 percent versus 33 percent).

Figure 2—Percentage distribution of 1995–96 beginning postsecondary students according to college entrance examination scores (SAT/ACT composite), by first-generation status



NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

The disparity between first-generation students' participation in college entrance examinations and that of their counterparts whose parents graduated from college was also apparent with respect to SAT II and AP examinations (table 5).[8] Compared to students whose parents had a college degree, first-generation students were less likely to have taken the SAT II (8 percent versus 23 percent) and, if they took the examination, were more likely to score below 550 points.

[8]It is important to note that differences in Advanced Placement (AP) test-taking and achievement levels may reflect the type of high schools that first-generation students attended and the availability of AP courses. It is possible that first-generation students are more likely to attend high schools that do not offer advanced level or AP courses necessary to complete a rigorous academic curriculum.

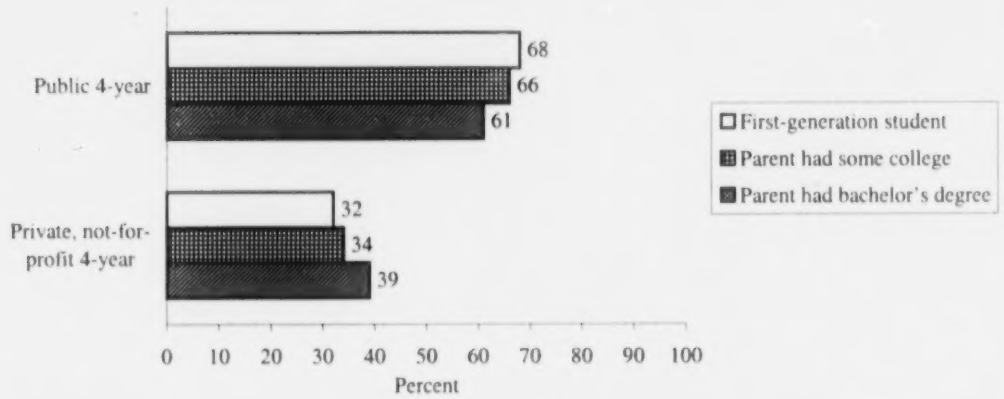
First-generation students were less likely than both students whose parents had attended some college and those whose parents had finished college to report taking any AP test (8 percent versus 14 percent and 22 percent, respectively). Finally, although first-generation students' average AP score did not differ from that of students whose parents had some college education, first-generation students' scores were, on average, lower than those of students whose parents had graduated from college (2.7 points versus 3.0 points).

Postsecondary Education

Among students who first attended 4-year institutions of higher education, first-generation students and students whose parents completed college differed with respect to their postsecondary enrollment behavior and major field of study. Overall, first-generation students were more likely than their non-first-generation peers to enter public comprehensive universities and to attend college part time.

As shown in figures 3 and 4, among students who had first entered 4-year postsecondary institutions, first-generation students were less likely than students whose parents graduated from college to begin their postsecondary education in private institutions (32 percent versus 39 percent) (figure 3) and more likely to attend comprehensive universities (41 percent versus 26 percent) (figure 4). In contrast, students whose parents completed college were more likely than first-generation students to attend research universities (52 percent versus 31 percent).

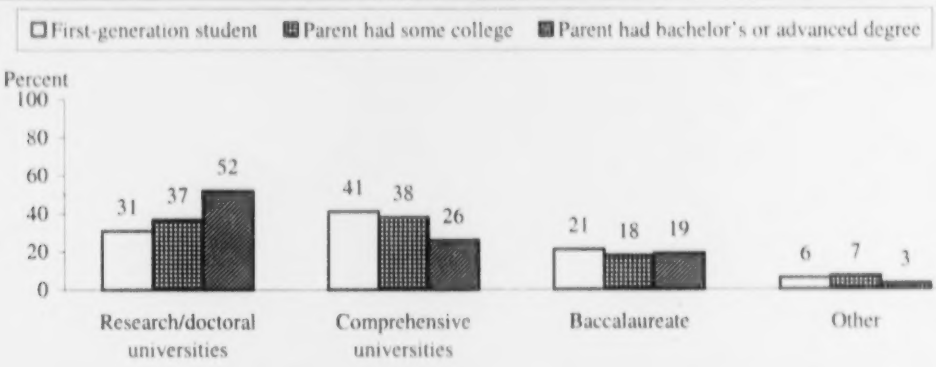
Figure 3—Percentage distribution of 1995–96 beginning postsecondary students according to type of initial 4-year institution attended, by first-generation status



NOTE: Details may not sum to 100 due to rounding. Includes public and private, not-for-profit 4-year institutions. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Figure 4—Percentage distribution of 1995–96 beginning postsecondary students according to Carnegie classification of initial institution, by first-generation status



NOTE: Details may not sum to 100 due to rounding. Includes public and private, not-for-profit 4-year institutions. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

First-generation students were also more likely than students whose parents had bachelor's degrees to work full time and attend college part time (table 6). A larger proportion of first-generation students attended college on a part-time basis than did students whose parents had a bachelor's degree (27 percent versus 22 percent). This finding may be partly due to the fact that first-generation students were also more than twice as likely as those with college-degreed parents to report working full time while in school (22 percent versus 9 percent).

Table 6—Percentage distribution of 1995–96 beginning postsecondary students according to enrollment and employment status in 1997–98 academic year, by first-generation status

			Non-first-generation student	
	Total	First-generation student	Parent had some college	Parent had bachelor's or advanced degree
Total	100.0	100.0	100.0	100.0
Enrollment status[1]				
Full time	75.6	72.9	73.9	78.3
Less than full time	24.4	27.1	26.1	21.7
Employment status[2]				
Did not work while enrolled	29.5	24.8	22.5	33.2
Worked part time while enrolled	56.7	53.6	61.1	57.8
Worked full time while enrolled	13.8	21.6	16.4	9.0

[1]Less than full-time enrollment status includes students who reported always attending postsecondary education on a part-time basis and those who reported "mixed" enrollment status, including some part-time and some full-time.

[2]Part-time employment status indicates working less than 35 hours per week.

NOTE: Column details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

By the end of the 1997–98 academic year, these two student groups also reported choosing different fields of study (table 7). First-generation students were less likely than those whose parents had college degrees to declare social/behavioral sciences and life sciences as their major field of study (11 and 6 percent versus 17 and 10 percent, respectively). However, first-generation students were much more likely than students whose parents completed college to choose business/management as their major field of study (25 percent versus 17 percent). This finding may be related to previous research that shows that "being very well off financially" was very important to first-generation students (Nuñez and Cuccaro-Alamin 1998).

Academic Performance

Thus far this report has confirmed previous research indicating clear differences between first-generation and non-first-generation students on such dimensions as secondary academic preparation, postsecondary enrollment behavior, and field of study (Nuñez and Cuccaro-Alamin 1998). The next section takes this comparison one step further by examining two key issues: whether students' postsecondary academic performance differs by their first-generation and non-first-generation status, and if large differences do exist between the groups, whether this difference remains after controlling for high school academic preparation and entrance examination test scores. To address these questions, the analysis used two measures of academic performance: college grade-point average (GPA) and the number of remedial courses that students took during their first year of college.

As shown in table 8, first-generation students and students whose parents had some college earned lower overall GPAs than did students whose parents completed college (2.6 each versus 2.8 points). Also, first-generation students were more likely than students whose parents had a college degree to have taken one or more remedial courses during their first year in college (21 percent versus 10 percent) (table 9).

Controlling for Academic Rigor of High School Courses

The rigor of students' high school curriculum was strongly associated with their first-year GPA. As overall rigor in the curriculum increased so did students' GPA; on average, students whose high school coursework did not exceed the core New Basics curriculum had a lower GPA than did those who took rigorous coursework (2.5 points versus 3.1 points) (table 8). This finding suggests that those students who took difficult courses in high school were better prepared for the academic rigors of college.

Table 7—Percentage distribution of 1995–96 beginning postsecondary students attending 4-year institutions according to major field of study in 1997–98 academic year, by first-generation status

	Undeclared/ no major	Humanities	Social/ behavioral sciences	Life sciences	Physical sciences/ mathematics	Computer/ information science	Education	Engineering	Business/ management	Health	Vocational/ technical	Other technical/ professional
Total	3.3	13.1	14.7	8.4	2.5	3.6	8.4	6.6	19.5	8.2	2.7	9.2
First-generation status												
First-generation student	4.2	10.2	10.9	6.2	1.8	3.4	10.1	6.1	25.4	8.8	3.8	9.2
Non-first-generation student	2.9	14.0	16.2	9.5	2.8	3.7	8.0	6.7	17.1	8.0	2.4	9.0
Parent had some college	4.0	12.0	12.5	7.8	2.6	4.4	8.4	6.3	18.7	11.2	3.4	8.6
Parent had bachelor's or advanced degree	2.5	14.6	17.4	10.0	2.9	3.4	7.8	6.9	16.5	6.9	2.1	9.1

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent).

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Table 8—First-year grade-point average (GPA) of 1995–96 beginning postsecondary students according to college entrance examination score (SAT/ACT composite) and academic rigor of secondary school curriculum, by first-generation status

		College entrance examination score			Overall rigor			
	Total	Lowest quartile (790 or lower)	Middle quartiles (800–1090)	Highest quartile (1100 or higher)	Core New Basics or below	Beyond New Basics I	Beyond New Basics II	Rigorous
Total	2.7	2.2	2.7	3.1	2.5	2.6	2.7	3.1
First-generation status								
First-generation student	2.6	2.2	2.7	3.1	2.4	2.5	2.7	3.0
Non-first-generation student								
Parent had some college	2.6	2.3	2.6	3.2	2.4	2.6	2.7	3.1
Parent had bachelor's or advanced degree	2.8	2.3	2.8	3.1	2.7	2.8	2.8	3.1

NOTE: Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score. Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

In addition, among students whose secondary curriculum did not exceed the core New Basics or only somewhat exceeded it, first-generation students had a lower GPA than students whose parents had a college education. Among students whose secondary curriculum somewhat exceeded the core New Basics, first-generation students had a 2.5 GPA, while students whose parents had completed college had a GPA of 2.8. The differences between first-generation students and those whose parents earned a degree, however, were not observed among students whose secondary curriculum was rigorous or substantially exceeded the core New Basics.

As with students' first-year GPA, the rigor of students' high school curriculum was related to the number of remedial courses taken during the first year of postsecondary education (table 9). Overall, as the rigor of the secondary curriculum rigor increased, the proportion of students who took one or more remedial courses decreased from 21 percent to 3 percent. Among students who somewhat or substantially exceeded the core New Basics in high school, first-generation students were more likely than students whose parents finished college to have taken one or more remedial courses during their first year of postsecondary education. For example, 15 percent of first-generation students whose secondary curriculum substantially exceeded the core New Basics took one or more remedial courses, compared with 6 percent of their counterparts whose parents had completed college. In contrast, among students who took rigorous coursework in high school, first-generation students did not differ from either group of non-first-generation students.

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Table 9—Percentage distribution of 1995–96 beginning postsecondary students according to number of remedial education courses taken during first year of postsecondary enrollment, by academic rigor of secondary school curriculum and first-generation status

	Remedial courses	
	None	One or more
Total	85.0	15.0
Overall rigor		
Core New Basics or below	79.2	20.8
Beyond New Basics I	83.0	17.1
Beyond New Basics II	90.9	9.2
Rigorous	96.6	3.4
	First-generation	
Total	79.0	21.0
Overall rigor		
Core New Basics or below	76.6	23.4
Beyond New Basics I	76.7	23.3
Beyond New Basics II	85.1	14.9
Rigorous	94.7	5.3
	Parent had bachelor's or advanced degree	
Total	90.1	9.9
Overall rigor		
Core New Basics or below	83.7	16.3
Beyond New Basics I	88.0	12.0
Beyond New Basics II	94.0	6.0
Rigorous	97.0	3.0
	Parent had some college	
Total	82.2	17.8
Overall rigor		
Core New Basics or below	76.2	23.8
Beyond New Basics I	79.5	20.5
Beyond New Basics II	89.5	10.5
Rigorous	95.8	4.2

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Controlling for College Entrance Examinations

As with the rigor of students' high school curriculum, students' college entrance examination scores were strongly associated with their first-year GPAs. Students with higher college entrance examination scores tended also to have higher first-year GPAs (table 8). For example, on average, first-generation students who scored 790 points or lower on the SAT/ACT earned lower grades in the first year of college than their counterparts who scored at least 1100 points on the college entrance examination (2.2 GPA versus 3.1 GPA).

Taking this relationship between high school achievement and postsecondary performance into account, there was little variation between the two groups. That is, after controlling for entrance examination scores, no significant differences were found between the GPAs of first-generation and non-first-generation students. In addition, though a seemingly large proportion of all students took remedial courses during their first year of postsecondary education (15 percent), this was related to their entrance examination scores. As college entrance examination scores increased, the percentage of students taking one or more remedial classes during their first year of postsecondary education decreased from 35 percent to 2 percent (table 10).

Students' scores on entrance examinations were also related to differences between first-generation and non-first-generation students in remedial coursetaking. Among those in the lowest quartile, first-generation students were more likely than students whose parents had earned a bachelor's degree (but not those whose parents had some college education) to have taken one or more remedial classes during their first year of postsecondary education (38 percent versus 29 percent and 36 percent, respectively). Among students who scored in the middle or highest college entrance examination quartile, first-generation students were no more likely than their non-first-generation counterparts to have taken one or more remedial courses at this time.

Table 10—Percentage distribution of 1995–96 beginning postsecondary students according to number of remedial education courses taken during first year of postsecondary enrollment, by college entrance examination score (SAT/ACT composite) and first-generation status

	Remedial courses	
	None	One or more
Total	85.0	15.0
College entrance examinations		
Lowest quartile (790 or lower)	65.5	34.5
Middle quartiles (800–1090)	89.9	10.1
Highest quartile (1100 or higher)	97.7	2.3
	First-generation	
Total	79.0	21.0
College entrance examinations		
Lowest quartile (790 or lower)	62.0	38.0
Middle quartiles (800–1090)	88.6	11.4
Highest quartile (1100 or higher)	96.1	3.9
	Parent had bachelor's or advanced degree	
Total	90.1	9.9
College entrance examinations		
Lowest quartile (790 or lower)	71.3	28.7
Middle quartiles (800–1090)	91.3	8.7
Highest quartile (1100 or higher)	97.9	2.1
	Parent had some college	
Total	82.2	17.8
College entrance examinations		
Lowest quartile (790 or lower)	64.1	36.0
Middle quartiles (800–1090)	88.0	12.0
Highest quartile (1100 or higher)	98.1	1.9

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Persistence and Attainment

Previous research on first-generation students showed that they were less likely than their non-first-generation counterparts to have completed their postsecondary education within 5 years. This negative trend was especially evident for students who began at 4-year public and private, not-for-profit institutions (Nuñez and Cuccaro-Alamin 1998). The current analysis extends this previous research by investigating the possible source of variation between the groups: that is, does this difference remain after controlling for high school academic preparation and college entrance examination scores? To address this question, this analysis looks at the following dimensions of persistence and attainment: 1) number of enrollment spells, 2) retention at the initial 4-year institution, 3) persistence track to a bachelor's degree, and 4) attainment or last academic year of enrollment through 1998.

Number of Enrollment Spells

An "enrollment spell" is a period of continuous enrollment at one or more institutions. One spell ends each time the student is not enrolled in a postsecondary education institution for more than 4 months. The new spell does not start until they enroll again. In this analysis, the number of enrollment spells was calculated as of the First Follow-up survey, which took place in spring 1998 about 3 years after the beginning postsecondary students initially enrolled. Enrollment spell is an important indicator of persistence and attainment because breaks in enrollment continuity will increase the time required to complete a program of study (Berkner, McCormick, and Cuccaro-Alamin 1996).

First-generation students were more likely than their peers whose parents completed college to have two or more enrollment spells (15 percent versus 10 percent) (table 11). This finding was particularly strong among students whose secondary curriculum somewhat exceeded the core New Basics, where first-generation students were more likely than students whose parents had a college education to have experienced two or more enrollment spells (18 percent versus 8 percent). Similarly, first-generation students were more likely than students with parents who completed college to experience two or more postsecondary enrollment spells when their college entrance examination scores were in the middle quartiles (17 percent versus 9 percent) (table 12). The same was not true for students who substantially exceed the core New Basics or took rigorous coursework or who scored in the top quartile, however; across levels of parents' education, there were no differences in the likelihood of having two or more enrollment spells.

Table 1i—Percentage distribution of 1995–96 beginning postsecondary students according to number of enrollment spells as of spring 1998, by academic rigor of secondary school curriculum and first-generation status

	Enrollment spells	
	One	Two or more
Total	87.8	12.2
Overall rigor		
Core New Basics or below	86.0	14.0
Beyond New Basics I	87.2	12.8
Beyond New Basics II	89.4	10.6
Rigorous	93.5	6.5
	First-generation	
Total	84.6	15.4
Overall rigor		
Core New Basics or below	86.5	13.5
Beyond New Basics I	82.3	17.7
Beyond New Basics II	83.4	16.6
Rigorous	89.5	10.5
	Parent had bachelor's or advanced degree	
Total	90.0	10.0
Overall rigor		
Core New Basics or below	85.3	14.7
Beyond New Basics I	91.7	8.3
Beyond New Basics II	91.4	8.6
Rigorous	94.2	5.8
	Parent had some college	
Total	85.4	14.6
Overall rigor		
Core New Basics or below	83.1	16.9
Beyond New Basics I	85.0	15.0
Beyond New Basics II	91.4	8.6
Rigorous	89.0	11.0

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score. An enrollment spell is a period of nonenrollment greater than four months.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Table 12—Percentage distribution of 1995–96 beginning postsecondary students according to number of enrollment spells as of spring 1998, by college entrance examination score (SAT/ACT composite) and first-generation status

	Enrollment spells	
	One	Two or more
Total	87.8	12.2
College entrance examinations		
Lowest quartile (790 or lower)	84.4	15.6
Middle quartiles (800–1090)	88.7	11.4
Highest quartile (1100 or higher)	91.4	8.7
First-generation		
Total	84.6	15.4
College entrance examinations		
Lowest quartile (790 or lower)	84.8	15.2
Middle quartiles (800–1090)	83.5	16.5
Highest quartile (1100 or higher)	85.8	14.2
Parent had bachelor's or advanced degree		
Total	90.0	10.0
College entrance examinations		
Lowest quartile (790 or lower)	85.0	15.0
Middle quartiles (800–1090)	91.3	8.7
Highest quartile (1100 or higher)	92.4	7.6
Parent had some college		
Total	85.4	14.6
College entrance examinations		
Lowest quartile (790 or lower)	81.5	18.5
Middle quartiles (800–1090)	85.7	14.3
Highest quartile (1100 or higher)	92.2	7.8

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Enrollment at Initial Institution 3 Years Later

This section describes students' status with respect to the initial 4-year institution as of the First Follow-up survey: that is, were students still enrolled at their initial postsecondary institution in June 1998? In general, first-generation students were less likely than students whose parents had completed a 4-year degree to be enrolled continuously at the initial institution or to have attained a degree at their initial institution (60 percent versus 73 percent) (table 13). Also, they were more likely than their peers whose parents had finished college to have stopped out or left their first institution (19 percent versus 8 percent).

Table 13—Percentage distribution of 1995–96 beginning postsecondary students according to outcome of first spell of continuous enrollment at first institution as of spring 1998, by academic rigor of secondary school curriculum and first-generation status

	Still enrolled/ attained at initial institution	Transferred	Left postsecondary education
Total	66.9	20.3	12.8
Overall rigor			
Core New Basics or below	61.8	22.9	15.3
Beyond New Basics I	66.7	24.3	9.0
Beyond New Basics II	69.0	21.9	9.1
Rigorous	83.5	13.5	3.1
		First-generation	
Total	60.1	20.7	19.3
Overall rigor			
Core New Basics or below	54.6	23.5	21.9
Beyond New Basics I	64.7	26.4	8.9
Beyond New Basics II	64.8	26.0	9.2
Rigorous	86.7	10.5	2.8
		Parent had bachelor's or advanced degree	
Total	72.8	19.4	7.8
Overall rigor			
Core New Basics or below	67.4	25.4	7.2
Beyond New Basics I	68.1	22.1	9.8
Beyond New Basics II	72.3	17.6	10.2
Rigorous	85.5	12.0	2.5
		Parent had some college	
Total	60.9	23.1	16.1
Overall rigor			
Core New Basics or below	57.0	20.4	22.6
Beyond New Basics I	64.0	28.4	7.6
Beyond New Basics II	67.6	23.3	9.1
Rigorous	74.4	17.6	8.0

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Students' academic preparation was also related to their enrollment at their initial postsecondary institution 3 years later. As the rigor of students' high school curriculum increased, so did the percentage of students who were still enrolled (or had attained a degree) at their first institution in June 1998—from 62 percent to 84 percent. Also, as rigor of the high school curriculum increased, the percentage of all students who transferred or stopped out or left their initial institution decreased.

Holding secondary curriculum rigor constant, there were only two differences between the enrollment patterns of students who were first generation and those who were not. Among students whose secondary curriculum was not rigorous, first-generation students were less likely than students whose parents had completed college (but not those whose parents had some college) to still be enrolled or have attained a degree 3 years later (55 percent versus 67 percent). Paralleling this trend, first-generation students whose secondary curriculum was not rigorous were more likely to have stopped out or left their initial institution than students whose parents had graduated from college (but not those whose parents had some college) (22 percent versus 7 percent).

These differences, however, were not apparent among students who took rigorous courses in high school. In these cases, first-generation students were as likely as their non-first-generation counterparts to be enrolled or have attained a degree in spring 1998. For example, among students who took rigorous coursework, 87 percent of first-generation students were still enrolled 3 years after entering college, compared with 86 percent of their counterparts whose parents had a bachelor's degree.

Academic achievement was also related to students' enrollment status (table 14). As students' college entrance examination scores increased, so did the percentage of students who were still enrolled or had attained a degree at their initial institution. Conversely, as academic achievement increased, the percentage of students who transferred or left postsecondary education decreased.

Holding college entrance examination scores constant, there was only one difference between first-generation and non-first-generation students with regard to their enrollment at their first institution 3 years later. Among students who scored in the lowest quartile in their college entrance examinations, first-generation students were more likely than students whose parents had completed college to have stopped out or left their first institution (21 percent versus 12 percent). Among students who scored in higher quartiles, however, parents' level of education was not related to enrollment in June 1998. For example, first-generation students were as likely as students whose parents had completed college to be continuously enrolled (or have attained a degree) 3 years after entering their initial institution (81 percent for each group).

Table 14—Percentage distribution of 1995–96 beginning postsecondary students according to outcome of first spell of continuous enrollment at first institution as of spring 1998, by college entrance examination score (SAT/ACT composite) and first-generation status

	Still enrolled/ attained at initial institution	Transferred	Left postsecondary education
Total	66.9	20.3	12.8
College entrance examinations			
Lowest quartile (790 or lower)	55.2	27.1	17.7
Middle quartiles (800–1090)	69.1	21.4	9.6
Highest quartile (1100 or higher)	80.4	13.6	6.0
		First-generation	
Total	60.1	20.7	19.3
College entrance examinations			
Lowest quartile (790 or lower)	52.3	27.2	20.5
Middle quartiles (800–1090)	66.3	22.7	11.0
Highest quartile (1100 or higher)	81.1	10.6	8.3
		Parent had bachelor's or advanced degree	
Total	72.8	19.4	7.8
College entrance examinations			
Lowest quartile (790 or lower)	60.5	27.5	12.0
Middle quartiles (800–1090)	72.2	20.6	7.2
Highest quartile (1100 or higher)	80.6	13.4	6.0
		Parent had some college	
Total	60.9	23.1	16.1
College entrance examinations			
Lowest quartile (790 or lower)	48.9	30.5	20.6
Middle quartiles (800–1090)	64.9	21.0	14.2
Highest quartile (1100 or higher)	77.2	16.5	6.3

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Persistence Track to a Bachelor's Degree

This section describes students' enrollment behavior through June 1998, focusing on whether students stayed on a "persistence track" toward attaining a bachelor's degree. In this study, a student who stays on the persistence track either remains at the initial 4-year institution in which they enrolled or makes a lateral transfer to a new 4-year institution with no break in enrollment.

Overall, first-generation students were less likely than students whose parents had completed a 4-year degree to stay on the persistence track (58 percent versus 77 percent) (table 15).

Table 15—Percentage distribution of 1995–96 beginning postsecondary students according to enrollment status as of spring 1998, by academic rigor of secondary school curriculum and first-generation status

	Stayed on persistence track	Left persistence track	Left without return
Total	68.0	17.9	14.0
Overall rigor			
Core New Basics or below	62.1	21.1	16.8
Beyond New Basics I	69.7	20.0	10.3
Beyond New Basics II	72.0	17.8	10.2
Rigorous	86.6	9.2	4.2
	First-generation		
Total	57.7	21.8	20.5
Overall rigor			
Core New Basics or below	55.0	21.8	23.2
Beyond New Basics I	65.5	25.0	9.6
Beyond New Basics II	63.7	25.8	10.5
Rigorous	81.2	14.0	4.8
	Parent had bachelor's or advanced degree		
Total	76.5	14.3	9.1
Overall rigor			
Core New Basics or below	69.2	21.5	9.4
Beyond New Basics I	74.7	13.8	11.5
Beyond New Basics II	76.1	12.7	11.2
Rigorous	89.1	7.5	3.4
	Parent had some college		
Total	60.6	22.3	17.1
Overall rigor			
Core New Basics or below	55.1	21.6	23.4
Beyond New Basics I	65.5	25.7	8.8
Beyond New Basics II	68.8	20.9	10.3
Rigorous	79.2	11.9	8.9

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score. A student who stays on the persistence track either remains at the initial 4-year institution in which they enrolled or makes a lateral transfer to a new 4-year institution with no break in enrollment.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Compared with their peers whose parents finished college, first-generation students were more likely to have left the persistence track (22 percent versus 14 percent), and were more than twice as likely to have left their first institution without returning (21 percent versus 9 percent).

Not surprisingly, given the findings related to the first enrollment spell, academic preparation was also related to students' remaining on the persistence track. As the rigor of students' high school curriculum increased, so did the likelihood that they would stay on the persistence track toward earning a bachelor's degree: 87 percent of all students who took rigorous academic coursework in high school stayed on the persistence track, while only 62 percent of students who did not take such coursework did so.

Differences between first-generation and non-first-generation students remained after controlling for the rigor of high school coursetaking. For example, among students whose secondary curriculum did not exceed the core New Basics, 55 percent of first-generation students stayed on the persistence track, compared with 69 percent of students whose parents had a bachelor's degree or more. Likewise, first-generation students who substantially exceeded the core New Basics in high school were more likely than their peers whose parents completed college to leave the persistence track (26 percent versus 13 percent). Finally, first-generation students whose coursework did not exceed the core New Basics left postsecondary education without returning at about double the rate of their counterparts whose parents had completed college (23 percent versus 9 percent).

However, much like the findings regarding the first enrollment spell, such differences were not apparent among students who took the most rigorous high school curricula. Regardless of first-generation status, between 79 and 89 percent of students who took rigorous curricula stayed on the persistence track. In addition, first-generation students who took rigorous curricula in high school were no more likely than their peers whose parents had a bachelor's degree to leave postsecondary education completely (5 percent versus 3 percent).

Controlling for students' scores on college entrance examinations yielded similar findings (table 16). As students' scores on these examinations increased, so did their likelihood of staying on the persistence track to the bachelor's degree: 83 percent of all students who scored in the highest quartile stayed on the persistence track, compared with only 55 percent of students scoring in the lowest quartile. First-generation students were less likely than students whose parents had a college degree to stay on the persistence track when their college entrance examination scores were in the lowest quartile (52 percent versus 63 percent) or in the middle quartile (65 percent versus 78 percent). In contrast, these two student groups did not differ with respect to staying on the persistence track when they scored in the highest quartile on college entrance examinations (75 percent versus 84 percent).

Table 16—Percentage distribution of 1995–96 beginning postsecondary students according to enrollment status as of spring 1998, by college entrance examination score (SAT/ACT composite) and first-generation status

	Stayed on persistence track	Left persistence track	Left without return
Total	68.0	17.9	14.0
College entrance examinations			
Lowest quartile (790 or lower)	55.2	25.2	19.6
Middle quartiles (800–1090)	71.4	17.8	10.8
Highest quartile (1100 or higher)	82.8	10.5	6.7
	First-generation		
Total	57.7	21.8	20.5
College entrance examinations			
Lowest quartile (790 or lower)	52.0	25.9	22.0
Middle quartiles (800–1090)	65.4	22.6	12.1
Highest quartile (1100 or higher)	74.5	15.9	9.6
	Parent had bachelor's or advanced degree		
Total	76.5	14.3	9.1
College entrance examinations			
Lowest quartile (790 or lower)	62.6	22.5	14.9
Middle quartiles (800–1090)	77.5	13.9	8.6
Highest quartile (1100 or higher)	84.0	9.6	6.5
	Parent had some college		
Total	60.6	22.3	17.1
College entrance examinations			
Lowest quartile (790 or lower)	48.5	29.5	22.0
Middle quartiles (800–1090)	62.3	22.6	15.1
Highest quartile (1100 or higher)	83.8	9.4	6.8

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score. A student who stays on the persistence track either remains at the initial 4-year institution in which they enrolled or makes a lateral transfer to a new 4-year institution with no break in enrollment.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Who Leaves Postsecondary Education

First-generation students were more likely than students whose parents had a bachelor's degree to leave college without returning by spring 1998 (table 16). Consistent with this pattern,

first-generation students were less likely than students whose parents had completed college to be enrolled 3 years after entering a 4-year institution (68 percent versus 86 percent) (table 17).[9]

Once again, the rigor of students' high school coursework made a difference in who left college and who stayed enrolled: the percentage of students who were enrolled and still working for a degree increased as the rigor of students' high school coursework increased (table 17).

First-generation status also made a difference for the least prepared students. After controlling for academic preparation, first-generation students who did not take a rigorous curriculum in high school were less likely than students whose parents completed college to be enrolled 3 years after entering a 4-year institution (65 percent versus 85 percent). However, among students who were more prepared—that is, students whose high school curriculum was rigorous—no differences in persistence were found according to students' parental level of education. For example, a large majority of both first-generation students (88 percent) and students whose parents completed college (94 percent) were still enrolled in June 1998.

In addition, students' college entrance examination scores were related to who left college and who stayed enrolled (table 18). The higher their college examination score, the less likely students were to leave postsecondary education during the first 2 years of college: 74 percent of students in the lowest quartile of examination scores were still working toward or had attained a degree in spring 1998, whereas 85 percent to 92 percent of their peers with higher scores reported the same. After controlling for academic preparation, first-generation students scoring in the lowest quartile were more likely than students whose parents had completed college to have left postsecondary education during the second academic year (1996–97). However, among students who scored in the highest quartile, first-generation students were as likely as students whose parents completed college to be enrolled.

[9]The results show a slightly higher proportion of first-generation students had attained a degree by June 1998, compared with students whose parents had a bachelor's degree (5 percent versus 3 percent). This is probably due to the fact that first-generation students transferred down more often and then earned an associate's or vocational certificate from a 2-year institution.

Table 17—Percentage distribution of 1995–96 beginning postsecondary students according to attainment level and year of postsecondary departure 3 years later (spring 1998), by academic rigor of secondary curriculum and first-generation status

	Total attained or still enrolled spring 1998	Attained by spring 1998	No degree			
			Still enrolled	Left without return in 1997–98	Left without return in 1996–97	Left without return in 1995–96
Total	81.7	4.0	77.7	4.1	7.2	7.0
Overall rigor						
Core New Basics or below	78.6	3.6	75.0	4.9	9.4	7.2
Beyond New Basics I	85.1	3.7	81.4	4.5	5.8	4.6
Beyond New Basics II	86.4	2.5	83.9	4.4	5.4	3.9
Rigorous	95.0	2.4	92.6	1.4	2.4	1.2
			First-generation			
Total	73.1	5.2	67.9	4.9	11.6	10.3
Overall rigor						
Core New Basics or below	70.0	5.5	64.5	7.1	12.9	9.9
Beyond New Basics I	84.9	5.0	79.9	2.4	8.1	4.6
Beyond New Basics II	86.3	3.9	82.4	5.4	6.0	2.4
Rigorous	92.9	5.4	87.5	1.7	4.4	1.0
			Parent had bachelor's or advanced degree			
Total	88.3	2.8	85.5	3.6	4.2	3.9
Overall rigor						
Core New Basics or below	87.6	2.2	85.4	3.3	6.2	2.9
Beyond New Basics I	86.7	3.5	83.2	5.0	3.0	5.4
Beyond New Basics II	85.8	0.9	84.9	4.5	4.6	5.1
Rigorous	96.1	1.7	94.4	1.4	0.9	1.7
			Parent had some college			
Total	76.6	5.6	71.0	4.6	10.0	8.8
Overall rigor						
Core New Basics or below	70.3	2.8	67.5	5.9	12.2	11.6
Beyond New Basics I	82.2	3.0	79.2	5.2	9.9	2.7
Beyond New Basics II	84.4	6.9	77.5	3.4	8.5	3.6
Rigorous	89.5	2.6	86.9	1.6	8.9	0.0

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score. Attained by spring 1998 refers to attainment at any 4-year institution and not only attainment at initial institution attended.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Table 18—Percentage distribution of 1995–96 beginning postsecondary students according to attainment level and year of postsecondary departure 3 years later (spring 1998), by college entrance examination score (SAT/ACT composite) and first-generation status

	Total attained or still enrolled spring 1998	Attained by spring 1998	No degree			
			Still enrolled	Left without return in 1997–98	Left without return in 1996–97	Left without return in 1995–96
Total	81.7	4.0	77.7	4.1	7.2	7.0
College entrance examinations						
Lowest quartile (790 or lower)	73.9	5.0	68.9	6.0	10.7	9.5
Middle quartiles (800–1090)	84.8	2.7	82.1	4.1	6.7	4.4
Highest quartile (1100 or higher)	92.2	2.4	89.8	2.1	2.7	3.0
			First-generation			
Total	73.1	5.2	67.9	4.9	11.6	10.3
College entrance examinations						
Lowest quartile (790 or lower)	71.1	6.4	64.7	4.2	13.8	10.9
Middle quartiles (800–1090)	80.6	2.7	77.9	6.3	8.2	4.9
Highest quartile (1100 or higher)	87.2	5.9	81.3	3.5	8.1	1.2
			Parent had bachelor's or advanced degree			
Total	88.3	2.8	85.5	3.6	4.2	3.9
College entrance examinations						
Lowest quartile (790 or lower)	81.5	5.1	76.4	6.5	5.0	7.0
Middle quartiles (800–1090)	88.7	2.1	86.6	3.6	5.2	2.5
Highest quartile (1100 or higher)	92.7	1.9	90.8	1.7	1.5	4.1
			Parent had some college			
Total	76.6	5.6	71.0	4.6	10.0	8.8
College entrance examinations						
Lowest quartile (790 or lower)	68.4	4.0	64.4	7.9	14.2	9.5
Middle quartiles (800–1090)	78.4	3.9	74.5	3.3	9.4	9.0
Highest quartile (1100 or higher)	93.2	3.1	90.1	2.5	3.8	0.5

NOTE: Details may not sum to 100 due to rounding. Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). The Scholastic Aptitude Test (SAT) and the American College Test (ACT) are college entrance examinations. The SAT/ACT variable is the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT/ACT combined score. Attained by spring 1998 refers to attainment at any 4-year institution and not only attainment at initial institution attended.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Controlling for Related Variables

The tabular analyses presented thus far have compared parents' education levels with students' preparation for postsecondary education, college enrollment and academic performance, and persistence and attainment. To answer the study's main research question—do first-generation students (who were otherwise as prepared academically as their counterparts) persist in college at a rate similar to that of students whose parents went to college—multiple regression analysis is necessary to determine the independent effects of specific variables on selected outcomes.

Two outcomes were examined in regression analyses: the proportion of students who were retained at the initial institution as of spring 1998 and the proportion of students who stayed on the persistence track to a bachelor's degree. The following independent variables were included in these models:

Students' background

- Parents' education (some college or college graduates versus high school or less (first-generation))
- Family income (low or high quartile versus middle two quartiles)
- Marital status (married versus not married)
- Race/ethnicity (black/non-Hispanic, Hispanic, Asian/Pacific Islander, or American Indian/Alaskan Native versus white)
- Gender (male versus female)

Preparation for postsecondary education

- Overall rigor of academic coursework (beyond New Basics I & II or rigorous versus core New Basics or below)
- College entrance examinations (low or high quartile versus middle two quartiles)

Postsecondary status

Enrollment status (full-time versus part-time)

Employment status (did not work or part-time versus full-time employment)

Postsecondary academic performance

First-year GPA (low or high quartile versus middle two quartiles)

Remedial courses (no remedial course taken versus one or more remedial courses taken)

Enrollment at Initial Institution 3 Years Later

The first regression model examined how likely beginning postsecondary students were to stay enrolled at their initial institution, controlling for the independent variables listed above. The results are presented in table 19. The first column of numbers provides the unadjusted percentages—that is, the proportion of students who stayed enrolled at the first institution before adjusting for covariation among all other independent variables. The second column shows the adjusted percentages—that is, the expected percentages for various subgroups after adjusting for covariance among the other variables. All comparisons and tests of statistical significance (indicated with asterisks) are made in relation to the reference group, which is presented in italics.

After adjusting for covariance among all variables, parents' education continued to be a significant factor in whether a student stayed at the initial institution. Compared with first-generation students, those whose parents attained a bachelor's degree or higher were more likely to persist at the initial institution in which they were enrolled. Even after controlling for interrelated variables such as family income, enrollment/employment status, and academic preparation and postsecondary achievement, first-generation status still had a negative effect on students' persistence at the initial institution in which they were enrolled relative to students whose parents completed college. At the same time, academic preparedness proved to be an important predictor of persistence at initial institution. After controlling for postsecondary achievement and parents' education as well as all other variables, students who took rigorous coursework in high school increased their chances of remaining at the 4-year institution in which they first enrolled.

Other characteristics associated with higher rates of retention in the original institution included having higher first-year GPAs; enrolling full time, rather than part time; and not working or only working part time, rather than working full time, while enrolled.

Table 19—Percentage of 1995–96 beginning postsecondary students who persisted at initial institution and the adjusted percentage after taking into account the covariation of the variables listed in the table

	Unadjusted percentages[1]	Adjusted percentages[2]	Least squares coefficient[3]	Standard error[4]
Total	66.9	66.9	51.6	4.35
Overall rigor of coursework				
Beyond New Basics I	66.7	66.0	2.2	2.31
Beyond New Basics II	69.0	67.3	3.5	2.52
Rigorous	83.5*	73.0*	9.2	2.88
Core New Basics or below	*61.8*	*63.8*	†	†
College entrance examinations				
Lowest quartile (400–790)	55.2*	62.4*	-5.1	2.39
Highest quartile (1091–1600)	80.4*	70.4	2.9	2.39
Middle quartiles (800–1090)	*69.1*	*67.5*	†	†
First-generation status				
Parents had some college	60.9	64.2	-0.5	2.64
Parents had bachelor's degree	72.8*	69.2*	4.5	2.24
First-generation	*60.0*	*64.7*	†	†
First-year GPA				
Lowest quartile (0– 2.11)	41.2*	46.0*	-26.3	2.24
Highest quartile (3.27–4.0)	79.9*	77.5*	5.3	2.31
Middle quartiles (2.12–3.26)	*72.6*	*72.2*	†	†
Remedial courses				
No remedial course taken	68.3*	66.7	-1.5	2.64
One or more remedial courses taken	*58.6*	*68.2*	†	†
Enrollment status				
Full-time	70.6*	68.4*	6.3	2.17
Part-time	*55.5*	*62.2*	†	†
Employment status				
Did not work	77.0*	70.5*	15.6	3.03
Part-time	74.0*	67.9*	13.0	2.80
Full-time	*50.8*	*54.9*	†	†
Gender				
Male	66.2	67.3	-8.5	4.87
Female	*67.4*	*66.6*	†	†
Marital status				
Married	48.5*	58.7	-8.5	4.87
Not married	*67.6*	*67.2*	†	†

Table 19—Percentage of 1995–96 beginning postsecondary students who persisted at initial institution and the adjusted percentage after taking into account the covariation of the variables listed in the table—Continued

	Unadjusted percentages[1]	Adjusted percentages[2]	Least squares coefficient[3]	Standard error[4]
Race/ethnicity				
Black, non-Hispanic	59.0*	69.9	4.2	3.20
Hispanic	64.1	68.4	2.7	2.90
Asian/Pacific Islander	75.4	72.8	7.1	3.81
American Indian/Alaskan Native	75.9	74.2	8.5	11.25
White	*67.7*	*65.7*	†	†
Percentile rank of family income				
Lowest quartile	62.1	66.5	-5.1	2.39
Highest quartile	70.0	66.0	2.9	2.39
Middle quartiles	*67.0*	*67.6*	†	†

*p≤.05.

† Not applicable for the reference group.

[1]The estimates are from the BPS:96/98 Data Analysis System.

[2]The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient multiplied by 100 to reflect percentage (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect multiplied by 100 to reflect percentage (see appendix B).

NOTE: Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). College entrance examinations include the SAT I and ACT. Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

Persistence Track to a Bachelor's Degree

The second regression model examined how likely beginning postsecondary students were to stay on the persistence track to a bachelor's degree—that is, to remain at their initial institution or make a lateral transfer to a comparable 4-year institution. This model used the same independent variables described above. The results are presented in table 20.

As with retention at the initial institution of enrollment, after adjusting for covariance among all other variables, parents' education remained a significant factor in whether a student stayed on the persistence track. Compared with first-generation students, those whose parents attained a bachelor's degree or higher were more likely to stay on the track to a bachelor's degree. Moreover, academic preparedness also continued to be an important predictor of staying power. After controlling for postsecondary achievement and parents' education as well as all

Table 20—Percentage of 1995–96 beginning postsecondary students who stayed on persistence track to bachelor's degree and the adjusted percentage after taking into account the covariation of the variables listed in the table

	Unadjusted percentages[1]	Adjusted percentages[2]	Least squares coefficient[3]	Standard error[4]
Total	68.0	68.0	42.0	3.91
Overall rigor of coursework				
Beyond New Basics I	69.7*	67.8	3.8	2.08
Beyond New Basics II	72.0*	69.7*	5.8	2.26
Rigorous	86.0*	73.4*	9.4	2.59
Core New Basics or below	*62.1*	*63.9*	†	†
College entrance examinations				
Lowest quartile (400–790)	55.2*	65.3	-3.5	2.15
Highest quartile (1091–1600)	82.8*	69.3	0.5	2.15
Middle quartiles (800–1090)	*71.4*	*68.8*	†	†
First generation status				
Parents had some college	60.6	64.5	0.4	2.38
Parents had bachelor's degree	76.5*	71.6*	7.5	2.02
First-generation	*57.7*	*64.1*	†	†
First-year GPA				
Lowest quartile (0– 2.11)	35.3*	41.7*	-32.9	2.01
Highest quartile (3.27–4.0)	84.8*	81.8*	7.3	2.08
Middle quartiles (2.12–3.26)	*75.3*	*74.6*	†	†
Remedial courses				
No remedial course taken	70.0*	67.9	-1.2	2.38
One or more remedial courses taken	*57.9*	*69.1*	†	†
Enrollment status				
Full-time	73.4*	70.4*	9.9	1.95
Part-time	*51.5*	*60.6*	†	†
Employment status				
Did not work	79.3*	71.8*	22.9	2.73
Part-time	77.6*	70.7*	21.7	2.52
Full-time	*42.1*	*49.0*	†	†
Gender				
Male	65.3*	66.7	-2.4	1.62
Female	*70.2*	*69.1*	†	†
Marital status				
Married	37.5*	52.5*	-16.1	4.38
Not married	*69.2*	*68.6*	†	†

Table 20—Percentage of 1995–96 beginning postsecondary students who stayed on persistence track to bachelor's degree and the adjusted percentage after taking into account the covariation of the variables listed in the table—Continued

	Unadjusted percentages[1]	Adjusted percentages[2]	Least squares coefficient[3]	Standard error[4]
Race/ethnicity				
Black, non-Hispanic	56.4*	70.0	3.4	2.88
Hispanic	66.1	72.5*	5.9	2.61
Asian/Pacific Islander	74.5	72.4	5.8	3.43
American Indian/Alaskan Native	82.1	82.5	15.9	10.12
White	*69.2*	*66.6*	†	†
Percentile rank of family income				
Lowest quartile	59.6*	64.8	-3.2	2.08
Highest quartile	75.8*	70.8	2.8	1.96
Middle quartiles	*67.0*	*68.0*	†	†

*$p \leq .05$.

† Not applicable for the reference group.

[1]The estimates are from the BPS:96/98 Data Analysis System.

[2]The percentages are adjusted for differences associated with other variables in the table (see appendix B).

[3]Least squares coefficient multiplied by 100 to reflect percentage (see appendix B).

[4]Standard error of least squares coefficient, adjusted for design effect multiplied by 100 to reflect percentage (see appendix B).

NOTE: Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). College entrance examinations include the SAT I and ACT. Core New Basics curriculum includes 4 years of English, 3 years of mathematics, 3 years of science and social studies. Beyond New Basics I includes core New Basics and at least two of three science courses (biology, chemistry, or physics), algebra I and geometry, plus 1 year of foreign language. Beyond New Basics II includes core New Basics, advanced science (biology, chemistry, and physics) and advanced math (including algebra I, geometry, algebra II), plus 2 years of foreign language. Rigorous includes core New Basics, advanced science (biology, chemistry, and physics), 4 years of math (including algebra I, geometry, algebra II, precalculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score. A student who stays on the persistence track either remains at the initial 4-year institution in which they enrolled or makes a lateral transfer to a new 4-year institution with no break in enrollment.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

other variables, students who at least substantially exceeded the core New Basics in high school increased their chances of staying on the persistence track compared with students who took non-rigorous coursework.

Similar to the previous regression model, other variables associated with higher rates of persistence included having higher first-year GPAs, enrolling full time versus part time, and not working or only working part time versus working full time while enrolled. However, unlike the findings on retention at the first institution, married students were less likely than unmarried students to stay on the persistence track and Hispanic students were more likely than white students to stay on the persistence track.

Conclusions

First-generation students—students who represent at least one-quarter of high school graduates—are less likely than their counterparts whose parents have more education to be prepared academically for postsecondary education. Consequently, first-generation students are less likely to enroll in 4-year institutions and, if they do, are less likely to persist in college. To understand the roots of these outcomes, this study examined how academic preparation in high school affects the differences in outcomes of first-generation students and non-first-generation students.

First and foremost, students who took rigorous coursework in high school were very likely to persist in 4-year postsecondary institutions. In addition, rigorous academic preparation in high school seemed to play a substantial role in narrowing the gap in postsecondary outcomes between first-generation students and their peers whose parents graduated college. At the same time, results from the multivariate analysis showed that parents' levels of education were associated with rates of students' retention and persistence in college, even when controlling for measures of academic preparedness. First-generation students were less likely than their peers whose parents had a bachelor's degree to be enrolled at their initial institution 3 years later and to stay on the persistence track to a bachelor's degree.

Nevertheless, regardless of postsecondary achievement, parents' education, and other background characteristic variables, students' level of academic preparedness remains an important predictor of retention and persistence in college. Students who took rigorous coursework in high school significantly increased their chances of either being enrolled at their initial institution 3 years later or making a lateral transfer to a comparable institution and of attaining a college degree. Overall, these results indicate that providing first-generation students the opportunity to take rigorous coursework in high school will increase their chances of succeeding in college.

References

Adelman, C. (1999). *Answers in the Toolbox: Academic Intensity, Attendance Patterns, and Bachelor's Degree Attainment*. U.S. Department of Education. Washington, DC: Office of Educational Research and Improvement.

Berkner, L.K., McCormick, A.C., and Cuccaro-Alamin, S. (1996). *Descriptive Summary of 1989–90 Beginning Postsecondary Students: 5 Years Later, With an Essay on Postsecondary Persistence and Attainment* (NCES 96–155). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Burkam, D., Lee, V., and Smerdon, B. (1996). *Mathematics Coursetaking and the NELS:88 Transcript Data*. Ann Arbor, MI: University of Michigan.

Choy, S.P. (2000). *Low-Income Students: Who They Are and How They Pay for Their Education* (NCES 2000–169). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Horn, L., and Nuñez, A.-M. (2000). *Mapping the Road to College: First-Generation Students' Math Track, Planning Strategies, and Context of Support* (NCES 2000–153). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Levine, A., and Nidiffer, J. (1996). *Beating the Odds: How the Poor Get to College*. San Francisco: Jossey-Bass.

National Commission on Excellence in Education. (1983). *A Nation at Risk: The Imperative for Educational Reform*. Washington, DC: Author.

Nuñez, A.-M., and Cuccaro-Alamin, S. (1998). *First-Generation Students: Undergraduates Whose Parents Never Enrolled in Postsecondary Education* (NCES 98–082). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Riley, R.W. (1997). *Mathematics Equals Opportunity*. White paper prepared by the U.S. Secretary of Education. Washington, DC: U.S. Department of Education.

Terenzini, P.T., Springer, L., Yaeger, P.M., Pascarella, E.T., and Nora, A. (1996). First-Generation Students: Characteristics, Experiences, and Cognitive Development. *Research in Higher Education, 37*(1): 1–22.

U.S. Department of Education, National Center for Education Statistics. (2000). *The Condition of Education 2000* (NCES 2000–062). Washington, DC: U.S. Government Printing Office.

U.S. General Accounting Office. (1994). *Higher Education: Grants Effective at Increasing Minorities' Chances of Graduating* (HEHS-94-168). Washington, DC: U.S. Government Printing Office.

U.S. General Accounting Office. (1995). *Higher Education: Restructuring Student Aid Could Reduce Low-Income Student Dropout Rate* (HEHS-95-48). Washington, DC: U.S. Government Printing Office.

Appendix A—Glossary

This glossary describes the variables used in this report. The variables were taken directly from the NCES BPS:96/98 Data Analysis Systems (DAS), which are NCES software applications that generate tables from the BPS: 98. A description of the DAS software can be found in appendix B. The variable labels below are in bold capital letters and correspond to the names of the variables in the DAS. In the index below, the variables in the five sections are listed in the order they appear in the report; the glossary is in alphabetical order in each section by variable name (displayed in the right-hand column).

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Persistence and attainment, first institution through 1998 ..... PRSIB1

Average score on Advanced Placement exams taken **APAVG**

Indicates the average score on all Advanced Placement examinations taken. Score range is 1–5 points, multiplied by 100 to show finer gradations of average scores (range is 100–500). When average scores are reported, this variable is divided by 100.

Number of Advanced Placement exams taken **APNUMBER**

Indicates the number of Advanced Placement tests respondent took in high school.

One
Two
Three
Four
Five or more

Coursetaking **CTAKING**

Ranks the rigor of courses taken by the respondent in high school. The categories include the following:

Core New Basics	Student completed core New Basics curriculum: 4 years of English and 3 years each of science, mathematics, and social studies.
Beyond New Basics I	Student completed core New Basics curriculum that included at least two of the following three science courses—biology, chemistry, or physics—and algebra I and geometry, plus 1 year of foreign language.
Beyond New Basics II	Student completed core New Basics curriculum that included advanced science (biology, chemistry, and physics) and advanced mathematics (algebra I, geometry, and algebra II), plus 2 years of foreign language.
Rigorous	Student completed core New Basics curriculum that included advanced science (biology, chemistry, and physics), 4 years of mathematics (algebra I, geometry, algebra II, pre-calculus), plus 3 years of foreign language and one honors/Advanced Placement course or Advanced Placement test score.

Enrollment status **ENIPTTB1**

Indicates the pattern of enrollment intensity during months enrolled, through June 1998.

Full time	Always enrolled full time
Less than full time	Always enrolled part time or had mixed enrollment pattern

Number of enrollment spells 1995–98 **ENSENUB1**

Counts the periods of continuous enrollment (at any institution), each separated by more than 4 months of nonenrollment, through June 1998.

One
Two or more

Highest level of mathematics completed or planned **HCMATHHI**

Identifies the highest level of mathematics the respondent had completed in high school or planned to take, according to self report on standardized test questionnaire completed during high school. The categories are the following:

Algebra
Geometry
Algebra II
Trigonometry
Pre-calculus
Calculus

Locale of high school **HSLOCALE**

Identifies the location of the high school attended by the respondent.

Large central city	In an area with a population greater than 250,000
Mid-size central city	In an area with a population of less than 250,000
Urban	On the fringe of a large city or mid-size city
Large town	In an area with a population greater than 25,000
Small town	In an area with a population less than 25,000
Rural	In a rural area

Percentage enrollment of underrepresented minority at secondary level **HSPCMIN**

Indicates the percentage enrollment of black, Hispanic, or American Indian/Alaskan Native students at respondent's high school. Responses were grouped as follows:

0–25 percent
26–50 percent
51–75 percent
76–100 percent

Type of high school **HSTYPESR**

Indicates the type of high school the respondent attended.

Public	Respondent attended a public high school.
Private	Respondent attended Catholic, other religious, and/or nonreligious private school.

Institution type by Carnegie Classification 1994 **INCARNEG**

Identifies the type of institution the respondent attended by Carnegie Classification. This classification system includes all colleges and universities in the United States that are degree granting and accredited by an agency recognized by the U.S. Secretary of Education.

Research/Doctoral Universities	Includes all institutions classified as Research Universities I/II and Doctoral Universities I/II. Research Universities I/II offer a full range of baccalaureate programs, are committed to graduate education through the doctorate, and give high priority to research. Institutions classified as Doctoral Universities I/II also offer a full range of baccalaureate programs and are committed to graduate education through the doctorate.
Comprehensive Universities	Includes all institutions classified as Master's (Comprehensive) Colleges and Universities I/II. These institutions offer a full range of baccalaureate programs and are committed to graduate education through the master's degree.
Baccalaureate	Includes all institutions classified as Baccalaureate (Liberal Arts) Colleges I/II. These institutions are primarily undergraduate colleges that place major emphasis on baccalaureate degree programs.
Other	Includes professional and specialized institutions offering degrees in areas such as art, music, design, religion, medicine, other health professions, engineering and technology, business and management, and law. In addition, degrees from theological seminaries, bible colleges, teachers' colleges, tribal colleges and universities, military institutes, maritime academies, and any other institutions that do not fit any other classification category are included in this grouping.

First institution level and control **ITNPSAS**

Identifies the type of postsecondary institution first attended by respondent.

Public 4-year	A postsecondary education institution that is supported primarily by public funds and operated by publicly elected or appointed officials who control the programs and activities and can award bachelor's degrees or higher, including institutions that award doctorate degrees and first-professional degrees. These degrees include chiropractic, pharmacy, dentistry, podiatry, medicine, veterinary medicine, optometry, law, osteopathic medicine, and theology.
Private, not-for-profit 4-year	A postsecondary education institution that is controlled by an independent governing board and incorporated under Section 501(c)(3) of the Internal Revenue Code and can award bachelor's degrees, including institutions that award doctorate degrees and first-professional degrees. These degrees include chiropractic, pharmacy, dentistry, podiatry, medicine, veterinary medicine, optometry, law, osteopathic medicine, and theology.
Public 2-year	A postsecondary education institution that is supported primarily by public funds and operated by publicly elected or appointed officials who control the programs and activities and that does not confer bachelor's degrees, but does provide 2-year programs that result in a certificate or an associate's degree, or 2-year programs that fulfill part of the requirements for a bachelor's degree at 4-year institutions.
Private, for-profit	A postsecondary education institution that is privately owned and operated as a profit-making enterprise. Includes career colleges and proprietary institutions. Level and control can be private, for-profit 4-year; private, for-profit 2-year; or private, for-profit less-than-2-year.
Other less-than-2-year	A postsecondary education institution in which at least one of the programs offered at the institution is 3 months or longer and that produces a terminal award or certificate. In addition, no program at the institution lasts longer than 2 years. The level and control can be private, not-for-profit 2-year; public less-than-2-year; and private, not-for-profit less-than-2-year institutions.

Employment status **JEHOURB1**

Indicates the number of hours worked while enrolled 1998.

Part-time	Worked less than 35 hours
Full-time	Worked 35 or more hours
Did not work	Worked 0 hours

Country of origin **ORIGIN**

Indicates the respondent's country of birth based on citizenship status.

Native born	Respondent was born in the United States.
Foreign born	Respondent was not born in the United States; respondent is a naturalized citizen, permanent resident, or nonresident alien.

Parents' highest education (first-generation status) **PBEDHI3**

Indicates the highest education level attained by either parent of the respondent. In 8 percent of the cases, the data was recoded where students' reporting of parental occupation and educational level were obviously dissonant; for example, where the parental occupation indicated required at least a college education.

First-generation	Parent had less than a high school education or a high school diploma.
Non-first-generation	Parent had either some college or earned a bachelor's degree or postgraduate/professional degree (see below).
Some college	Parent went to trade school, had less than two years of college, or had two or more years of college.
Bachelor's or advanced degree	Parent earned a bachelor's degree or postgraduate/professional degree.

Attainment and level of enrollment through 1998 **PRENRLB1**

Identifies whether students had attained a degree by June 1998 and whether they were enrolled during spring 1998 by level of institution. Responses were categorized as follows:

No degree
- Not enrolled
- Enrolled

Degree
- Attained associate's degree or certificate, not enrolled
- Attained associate's degree or certificate, enrolled in 2- or 4-year institution
- Attained bachelor's degree, not enrolled
- Attained bachelor's degree, enrolled in 2- or 4-year institution

Attainment and last year of enrollment through 1998 **PRENYRB1**

Identifies whether students had attained a degree by June 1998, and if not, indicates the last academic year that they were enrolled in postsecondary education.

No degree, left without return AY95–96
No degree, left without return AY96–97
No degree, left without return AY97–98
No degree, enrolled spring 1998
Attained by spring 1998

First persistence track exit type **PRFLTYB1**

Identifies the type of first departure from the persistence track. Responses were categorized as follows:

Did not leave track	Respondents stayed in the same 4-year institution or made a lateral transfer to a different 4-year institution.
Left track, transfer, stopout	Respondents left persistence track by making an immediate or delayed transfer from a 4-year institution to a less than 4-year institution, stopout, or delayed lateral/upward transfer.
Left without return	Respondents left without return to postsecondary education.

Persistence and attainment, first institution through 1998 **PRSIB1**

Identifies the outcome of the first institutional spell. The first institutional spell is the first spell of continuous enrollment at the first institution. For those who attained a degree before the spell ended, the variable identifies the degree attained. For those who did not attain before the spell ended, the variable distinguishes whether the student was still enrolled at the first institution in spring 1998, experienced a stopout and returned to the NPSAS institution, experienced a stopout and enrolled at a new institution, experienced an immediate transfer to a new institution, or left postsecondary education without returning at the end of the spell. Responses were grouped as follows:

Still enrolled/attained at first institution includes respondents who were identified as:
Continuous enrollment, no transfer, attained bachelor's degree
Continuous enrollment, no transfer, attained associate's degree
Continuous enrollment, no transfer, attained certificate
No degree, continuous enrollment, enrolled at institution
No degree, stopout, returned to first institution

Transferred includes respondents who had:
No degree, stopout or enrollment gap, enrolled at new institution
No degree, no stopout, enrolled at new institution

Left postsecondary education includes respondents who had:
No degree, left without return

Remedial courses taken 1995–96 **RMANYY1**

Indicates the number of remedial courses taken by respondents in 1995–96. These include courses in reading, writing, mathematics, study skills, or English language skills. The categories were defined as follows:

None
One or more

Average SAT II score **SAT2AVG**

Indicates the average score on all SAT II tests taken (range is 200–800). Scores were combined as follows:

Less than 450
451–550
551–650
651 or higher

Age **SBAGEFM**

Indicates the respondent's age when first enrolled at 1995–96 postsecondary institution. Age was defined in the following categories:

18 years or younger
19–24 years
25–29 years
30 years or older

Gender **SBGENDER**

Indicates respondent's gender.

Male
Female

Language spoken at home **SBLANG**

Identifies the language spoken most often at home when respondent was growing up.

English	Respondent spoke mostly English growing up.
Other	Respondent spoke mostly a language other than English, such as Spanish, Arabic, Bahasa, Chinese (Mandarin), Farsi, French and Canadian French, Gaelic, German, Hebrew, Hindi, Japanese, Korean, Malaysian (Bahasa Malay), Pakistani (Punjabi), Tagalog, Thai, Vietnamese, Welsh, or other

Marital status **SBMARRY1**

Indicates respondent's marital status during the 1995–96 academic year.

Not married	Respondent was single, never married; divorced; or widowed
Married	Respondent was married.
Separated	Respondent was separated.

Race/ethnicity **SBRACEI**

Indicates the race/ethnicity and citizenship status of respondent.

White, non-Hispanic	Respondent had origins in any of the original peoples of Europe, North Africa, or the Middle East (except those of Hispanic origin).
Black, non-Hispanic	Respondent had origins in any of the black racial groups of Africa, not of Hispanic origin.
Hispanic	Respondent was Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.
Asian/Pacific Islander	Respondent had origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or Pacific Islands. This includes people from China, Japan, Korea, the Philippine Islands, Samoa, India, and Vietnam.
American Indian/Alaskan Native	Respondent had origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.

Grade- point average (GPA) **SEGPAY1**

Indicates the average student GPA (standardized to a 4.00 point scale) as reported by the institution.

Major field of study **SEMAJ2B1**

Indicates respondent's major field of study when last enrolled 1998. The categories are the following:

Humanities
Social/behavioral sciences
Life sciences
Physical sciences/mathematics
Computer/information science
Engineering
Education
Business/management
Health
Vocational/technical
Other technical/professional
Undeclared/no major

Family income as percentile rank of income **SFPCT294**

Indicates percentile rank of income for all students (i.e., the proportion of students with income lower than that of the student). Calculated separately for dependent and independent students. Each ranking compares the student only to those of the same dependency status. Parent's income was used for dependent students. The categories are as follows:

Low income	Income fell at or below 125 percent of the 1994 federal poverty level.
Middle income	Income fell between 125 through 634 percent of the 1994 federal poverty level.
High income	Income fell at or above 635 percent of the federal poverty level.

Derived SAT combined score **TESATDER**

Indicates respondent's derived SAT score as either the sum of SAT verbal and mathematics scores or the ACT composite score converted to an estimated SAT combined score. Scores are combined as follows:

Lowest quartile	400–790
Middle quartiles	800–1090
Highest quartile	1100 or above

Appendix B—Technical Notes and Methodology

The Beginning Postsecondary Student Longitudinal Study (BPS:96/98)

The Beginning Postsecondary Student Longitudinal Study (BPS) is composed of the students who participated in the 1995–96 National Postsecondary Student Aid Study (NPSAS:96) who enrolled in postsecondary education for the first time in 1995–96. The National Postsecondary Student Aid Study (NPSAS) is a comprehensive nationwide study conducted by the U.S. Department of Education's National Center for Education Statistics (NCES) to determine how students and their families pay for postsecondary education.[10] It also describes demographic and other characteristics of students enrolled. The study is based on a nationally representative sample of all students in postsecondary education institutions, including undergraduate, graduate, and first-professional students. For NPSAS:96, information was obtained from more than 830 postsecondary institutions on approximately 44,500 undergraduate, 8,700 graduate, and 2,500 first-professional students. They represented about 16.7 million undergraduates, 2.4 million graduate students, and 300,000 first-professional students who were enrolled at some time between July 1, 1995 and June 30, 1996.

The BPS sample consists of approximately 12,000 students identified in NPSAS:96 as beginning postsecondary education for the first time. Unlike other NCES longitudinal surveys (such as High School and Beyond), which are based on age-specific cohorts, the BPS sample is more likely to include "nontraditional" postsecondary students, such as those who have delayed their education due to financial need or family responsibilities. The First Follow-up of the BPS cohort (BPS:96/98) was conducted in the spring and summer of 1998, approximately 3 years after they first enrolled. Approximately 10,300 of the students who first began in 1995–96 were located and interviewed in the First Follow-up. The weighted effective response rate in the 1998 follow-up of the NPSAS:96, for BPS-eligible respondents was 85.9 percent. The overall weighted response

[10]For more information on the NPSAS survey, consult U.S. Department of Education, National Center for Education Statistics, *Methodology Report for the 1995–96 National Postsecondary Student Aid Study* (NCES 98–073) (Washington, DC: 1997). Additional information is also available at the NPSAS website: http://nces.ed.gov/npsas.

rate (including those who were nonrespondents in NPSAS:96) for the BPS:96/98 First Follow-up was 79.8 percent.[11]

The BPS:96/98 Data Analysis System includes sample weights for cross-sectional analysis of the students in 1995–96 (B98IAWT) and longitudinal analysis of the sample through 1998 (B98AWT). All of the tables and estimates in this report used the longitudinal analysis weight.

Accuracy of Estimates

The statistics in this report are estimates derived from a sample. Two broad categories of error occur in such estimates: sampling and nonsampling errors. Sampling errors occur because observations are made only on samples of students, not entire populations. Nonsampling errors occur not only in sample surveys but also in censuses of entire populations. Non-sampling errors can be attributed to a number of sources: inability to obtain complete information about all students in all institutions in the sample (some students or institutions refused to participate, or students participated but answered only certain items); ambiguous definitions; differences in interpreting questions; inability or unwillingness to give correct information; mistakes in recording or coding data; and other errors of collecting, processing, sampling, and imputing missing data.

Data Analysis System

The estimates presented in this report were produced using the BPS:98 Data Analysis Systems (DAS). The DAS software allows users to specify and generate tables from the BPS:98 data. With the DAS, users can replicate or expand upon the tables presented in this report. In addition to the table estimates, the DAS calculates proper standard errors[12] and weighted sample sizes for these estimates. For example, table B1 contains estimated standard errors for the estimates provided in table 15 and was generated by the DAS. If the number of valid cases is too small to produce a reliable estimate, the DAS prints the message "low-N" instead of the estimate.

[11]For more information on the BPS:96/98 survey, consult U.S. Department of Education, National Center for Education Statistics, *Beginning Postsecondary Students Longitudinal Study First Follow-up 1996–98, Methodology Report* (NCES 2000–157) (Washington, DC: 2000).

[12]The BPS:98 samples are not simple random samples, and therefore simple random sample techniques for estimating sampling error cannot be applied to these data. The DAS takes into account the complexity of the sampling procedures and calculates standard errors appropriate for such samples. The method for computing sampling errors used by the DAS involves approximating the estimator by the linear terms of a Taylor series expansion. The procedure is typically referred to as the Taylor series method.

Table B1—Standard errors for table 15: Percentage distribution of 1995–96 beginning postsecondary students according to enrollment status as of spring 1998, by academic rigor of secondary school curriculum and first-generation status

	Stayed on persistence track	Left persistence track	Left without return
Total	0.9	0.7	0.7
Overall rigor			
Core New Basics or below	1.8	1.5	1.3
Beyond New Basics I	2.0	1.6	1.6
Beyond New Basics II	2.1	1.9	1.5
Rigorous	1.8	1.5	1.1
		First-generation	
Total	1.7	1.6	1.4
Overall rigor			
Core New Basics or below	3.3	2.9	2.7
Beyond New Basics I	3.7	3.6	1.8
Beyond New Basics II	4.6	4.8	2.0
Rigorous	4.1	3.6	2.4
		Parent had some college	
Total	2.3	1.9	2.0
Overall rigor			
Core New Basics or below	4.1	3.4	3.6
Beyond New Basics I	4.2	3.9	2.3
Beyond New Basics II	4.6	4.5	2.2
Rigorous	5.5	4.5	4.0
		Parent had bachelor's or advanced degree	
Total	1.2	0.9	1.0
Overall rigor			
Core New Basics or below	2.6	2.4	1.3
Beyond New Basics I	3.1	1.7	3.0
Beyond New Basics II	3.0	2.0	2.6
Rigorous	2.0	1.6	1.3

NOTE: Students in private, for-profit 4-year institutions are excluded from this analysis because the sample size was too small (less than 1 percent). A student who stays on the persistence track either remains at the initial 4-year institution in which they enrolled or makes a lateral transfer to a new 4-year institution with no break in enrollment.

SOURCE: U.S. Department of Education, National Center for Education Statistics, 1995–96 Beginning Postsecondary Students Longitudinal Study, First Follow-up (BPS:96/98).

In addition to tables, the DAS can also produce a correlation matrix of selected variables to be used for linear regression models. Included in the output with the correlation matrix are the design effects (DEFTs) for each variable in the matrix. Since statistical procedures generally compute regression coefficients based on simple random sample assumptions, the standard errors must be adjusted with the design effects to take into account the BPS:98 sample design.

The DAS can be accessed electronically at http://nces.ed.gov/DAS. For more information about BPS:98 Data Analysis System, contact:

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Statistical Procedures

Differences Between Means

The descriptive comparisons were tested in this report using Student's t statistic. Differences between estimates are tested against the probability of a Type I error,[13] or significance level. The significance levels were determined by calculating the Student's t values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing.

Student's t values may be computed to test the difference between estimates with the following formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}} \qquad (1)$$

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors. This formula is valid only for independent estimates. When estimates are not independent, a covariance term must be added to the formula:

[13] A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

$$\frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2 - 2(r)se_1 se_2}} \qquad (2)$$

where r is the correlation between the two estimates.[14] This formula is used when comparing two percentages from a distribution that adds to 100. If the comparison is between the mean of a subgroup and the mean of the total group, the following formula is used:

$$\frac{E_{sub} - E_{tot}}{\sqrt{se_{sub}^2 + se_{tot}^2 - 2p\ se_{sub}^2}} \qquad (3)$$

where p is the proportion of the total group contained in the subgroup.[15] The estimates, standard errors, and correlations can all be obtained from the DAS.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large t statistics may appear to merit special attention. This can be misleading since the magnitude of the t statistic is related not only to the observed differences in means or percentages but also to the number of students in the specific categories used for comparison. Hence, a small difference compared across a large number of students would produce a large t statistic.

A second hazard in reporting statistical tests for each comparison occurs when making multiple comparisons among categories of an independent variable. For example, when making paired comparisons among different levels of income, the probability of a Type I error for these comparisons taken as a group is larger than the probability for a single comparison. When more than one difference between groups of related characteristics or "families" are tested for statistical significance, one must apply a standard that assures a level of significance for all of those comparisons taken together.

Comparisons were made in this report only when $p \leq .05/k$ for a particular pairwise comparison, where that comparison was one of k tests within a family. This guarantees both that the individual comparison would have $p \leq .05$ and that for k comparisons within a family of possible comparisons, the significance level for all the comparisons will sum to $p \leq .05$.[16] For example, when comparing the percentages of males and females who enrolled in postsecondary education, only one comparison is possible (males versus females). In this family, $k=1$, and the comparison

[14] U.S. Department of Education, National Center for Education Statistics, *A Note from the Chief Statistician*, no. 2, 1993.

[15] Ibid.

[16] The standard that $p \leq .05/k$ for each comparison is more stringent than the criterion that the significance level of the comparisons should sum to $p \leq .05$. For tables showing the t statistic required to ensure that $p \leq .05/k$ for a particular family size and degrees of freedom, see Olive Jean Dunn, "Multiple Comparisons Among Means," *Journal of the American Statistical Association* 56 (1961): 52–64.

can be evaluated without adjusting the significance level. When students are divided into five racial/ethnic groups and all possible comparisons are made, then k=10 and the significance level of each test must be p≤ .05/10, or p≤ .005. The formula for calculating family size (k) is as follows:

$$k = \frac{j(j-1)}{2} \tag{4}$$

where j is the number of categories for the variable being tested. In the case of race/ethnicity, there are five racial/ethnic groups (American Indian/Alaskan Native; Asian/Pacific Islander; black, non-Hispanic; Hispanic; and white, non-Hispanic), so substituting 5 for j in equation 4,

$$k = \frac{5(5-1)}{2} = 10$$

Linear Trends

While most descriptive comparisons in this report were tested using Student's t statistic, some comparisons among categories of an ordered variable with three or more levels involved a test for a linear trend across all categories, rather than a series of tests between pairs of categories. In this report, when differences among percentages were examined relative to a variable with ordered categories, Analysis of Variance (ANOVA) was used to test for a linear relationship between the two variables. To do this, ANOVA models included orthogonal linear contrasts corresponding to successive levels of the independent variable. The squares of the Taylorized standard errors (that is, standard errors that were calculated by the Taylor series method), the variance between the means, and the unweighted sample sizes were used to partition total sum of squares into within- and between-group sums of squares. These were used to create mean squares for the within- and between-group variance components and their corresponding F statistics, which were then compared with published values of F for a significance level of .05.[17] Significant values of both the overall F and the F associated with the linear contrast term were required as evidence of a linear relationship between the two variables. Means and Taylorized standard errors were calculated by the DAS. Unweighted sample sizes are not available from the DAS and were provided by NCES.

[17]More information about ANOVA and significance testing using the F statistic can be found in any standard textbook on statistical methods in the social and behavioral sciences.

Adjustment of Means to Control for Background Variation

Crosstabular analyses identify important relationships; however, many variables used in crosstabular analyses may be correlated. For example, family income is related to socioeconomic status, which in turn is related to parental education levels. Hence, finding differences among family income groups, differences among socioeconomic status quartile groups, and differences among groups based on parental education levels are not unique findings. To identify the underlying effects for all three correlated variables, multivariate analyses describe the extent of differences in family income groups after adjustments for the relationships with socioeconomic status and parental education.

Multiple linear regression was used to obtain means that were adjusted for covariation among a list of control variables.[18] Adjusted means for subgroups were obtained by regressing the dependent variable on a set of descriptive variables such as gender, age, employment status, overall rigor of high school coursework, first-generation status, number of remedial courses taken in postsecondary education, and so on. Substituting ones or zeros for the subgroup characteristic(s) of interest and the mean proportions for the other variables results in an estimate of the adjusted proportion for the specified subgroup, holding the other variables in the equation constant. For example, consider a hypothetical case in which two variables, age and gender, are used to describe an outcome, Y (such as the percentage of students who left their initial institution). The variables age and gender are recoded into a dummy variable representing age, A, and a dummy variable representing gender, G:

Age	A
24 years or older	1
Less than 24 years old	0

and

Gender	G
Female	1
Male	0

The following regression equation is then estimated from the correlation matrix output from the DAS:

$$\hat{Y} = a + b_1 A + b_2 G \qquad (5)$$

[18]For more information about weighted least squares regression, see Michael S. Lewis-Beck, *Applied Regression: An Introduction*, Vol. 22 (Beverly Hills, CA: Sage Publications, Inc., 1980); William D. Berry and Stanley Feldman, *Multiple Regression in Practice*, Vol. 50 (Beverly Hills, CA: Sage Publications, Inc., 1987).

To estimate the adjusted mean for any subgroup evaluated at the mean of all other variables, one substitutes the appropriate values for that subgroup's dummy variables (1 or 0) and the mean for the dummy variable(s) representing all other subgroups. For example, suppose *Y* represents leaving the initial institution and is being described by age (*A*) and gender (*G*), coded as shown above. The unadjusted mean values of these two variables are as follows:

Variable	Mean
A	0.355
G	0.521

Next, suppose the regression equation results are as follows:

$$\hat{Y} = 0.15 + 0.17A + 0.01G \qquad (6)$$

To estimate the adjusted value for older students, one substitutes the appropriate parameter estimates and variable values into equation 6.

Variable	Parameter	Value
a	0.15	—
A	0.17	1.000
G	0.01	0.521

This results in the following equation:

$$\hat{Y} = 0.15 + (0.17)(1) + (0.01)(0.521) = 0.325$$

In this case, the adjusted mean for older students is 0.325 and represents the expected outcome for older students who resemble the average student across the other variables (in this example, gender). In other words, the adjusted percentage who left the initial institution after controlling for age and gender, is 32.5 percent (0.325 x 100 for conversion to a percentage).

It is relatively straightforward to produce a multivariate model using the DAS, since one of the DAS output options is a correlation matrix, computed using pairwise missing values. In regression analysis, there are several common approaches to the problem of missing data. The two simplest are pairwise deletion of missing data and listwise deletion of missing data. In pairwise deletion, each correlation is calculated using all of the cases for the two relevant variables. For example, suppose you have a regression analysis that uses variables X1, X2, and X3. The regression is based on the correlation matrix between X1, X2, and X3. In pairwise deletion the correlation between X1 and X2 is based on the nonmissing cases for X1 and X2. Cases missing on

either X1 or X2 would be excluded from the calculation of the correlation. In listwise deletion the correlation between X1 and X2 would be based on the nonmissing values for X1, X2, and X3. That is, all of the cases with missing data on any of the three variables would be excluded from the analysis.[19]

The correlation matrix can be used by most statistical software packages as the input data for least squares regression. That is the approach used for this report, with an additional adjustment to incorporate the complex sample design into the statistical significance tests of the parameter estimates (described below). For tabular presentation, parameter estimates and standard errors were multiplied by 100 to match the scale used for reporting unadjusted and adjusted percentages.

Most statistical software packages assume simple random sampling when computing standard errors of parameter estimates. Because of the complex sampling design used for the NPSAS survey, this assumption is incorrect. A better approximation of their standard errors is to multiply each standard error by the design effect associated with the dependent variable (DEFT),[20] where the DEFT is the ratio of the true standard error to the standard error computed under the assumption of simple random sampling. It is calculated by the DAS and produced with the correlation matrix.

[19]Although the DAS simplifies the process of making regression models, it also limits the range of models. Analysts who wish to estimate probit/logit models (which are the most appropriate for models with categorical dependent variables) can apply for a restricted data license from NCES. See John H. Aldrich and Forrest D. Nelson, Linear Probability, Logit and Probit Models (*Quantitative Applications in Social Sciences*, Vol. 45) (Beverly Hills, CA: Sage, 1984).

[20]The adjustment procedure and its limitations are described in C.J. Skinner, D. Holt, and T.M.F. Smith, eds., *Analysis of Complex Surveys* (New York: John Wiley & Sons, 1989).

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